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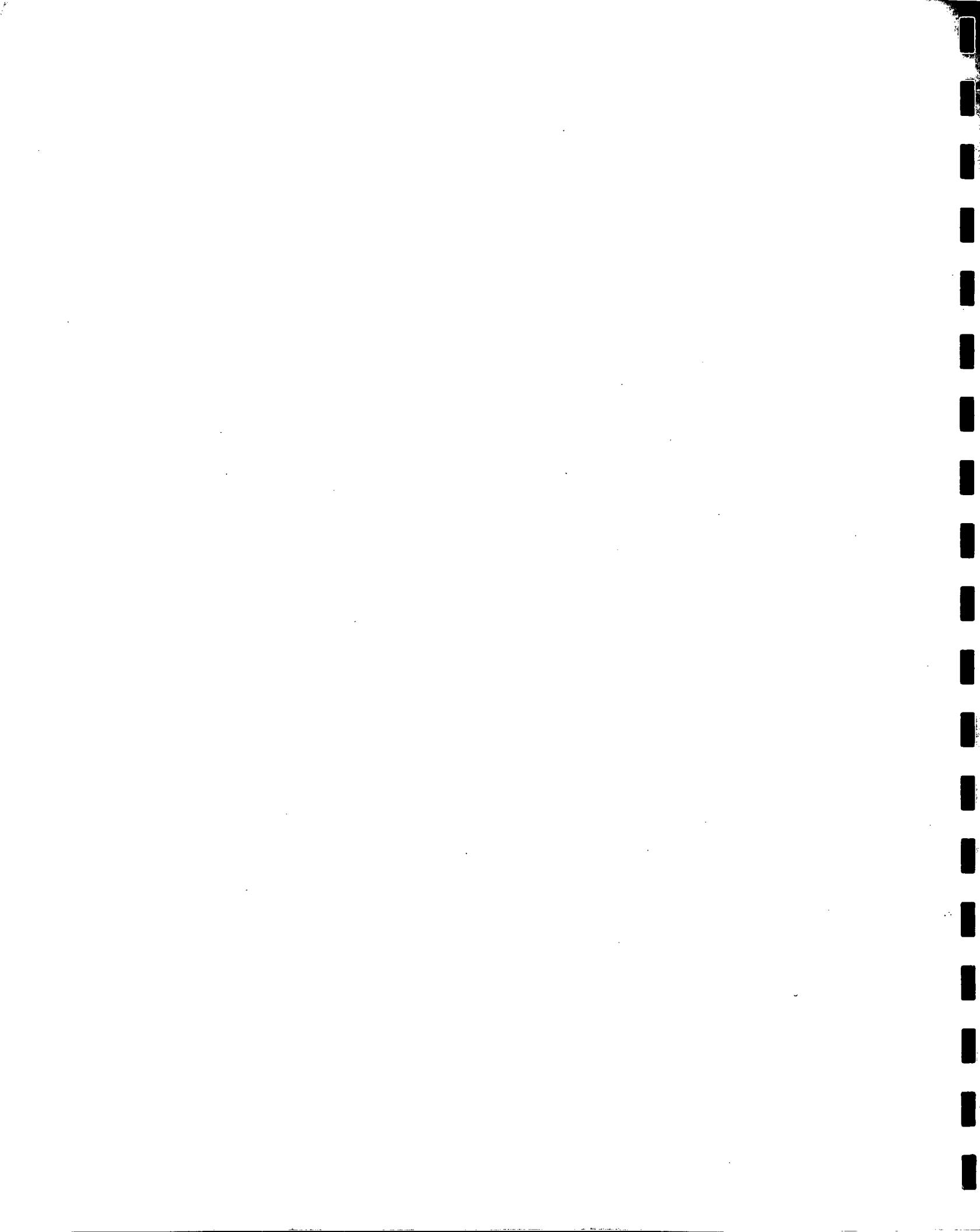
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**2007 Annual Water Quality Report
Carter Lake C&D Landfill (Closed)
Carter Lake, Iowa**

**Permit No. 78-SDP-02-80C
Project No. ANDEX 07101
November 2007**

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BARKER LEMAR
ENGINEERING CONSULTANTS

November 29, 2007

Ms. Amie Davidson
Iowa Department of Natural Resources
Waste & Energy Management Bureau
Wallace State Office Building
502 E. 9th Street
Des Moines, IA 50319

**Re: 2007 Annual Water Quality Report
Carter Lake C&D Landfill (Closed)
Permit No. 78-SDP-02-80C
Project No. ANDEX 07101**

Dear Ms. Davidson:

BARKER LEMAR ENGINEERING CONSULTANTS (BARKER LEMAR) has completed the water quality monitoring and assessment for the above-referenced site for the year 2007. Our services were performed in general accordance with Iowa Administrative Code (IAC) Section 114.26(4) and the current requirements for implementation of the Hydrologic Monitoring System Plan (HMS). Please find enclosed a copy of the 2007 Annual Water Quality Report for the above-referenced site.

If you have any questions regarding this report, please contact us at (515) 256-8814.

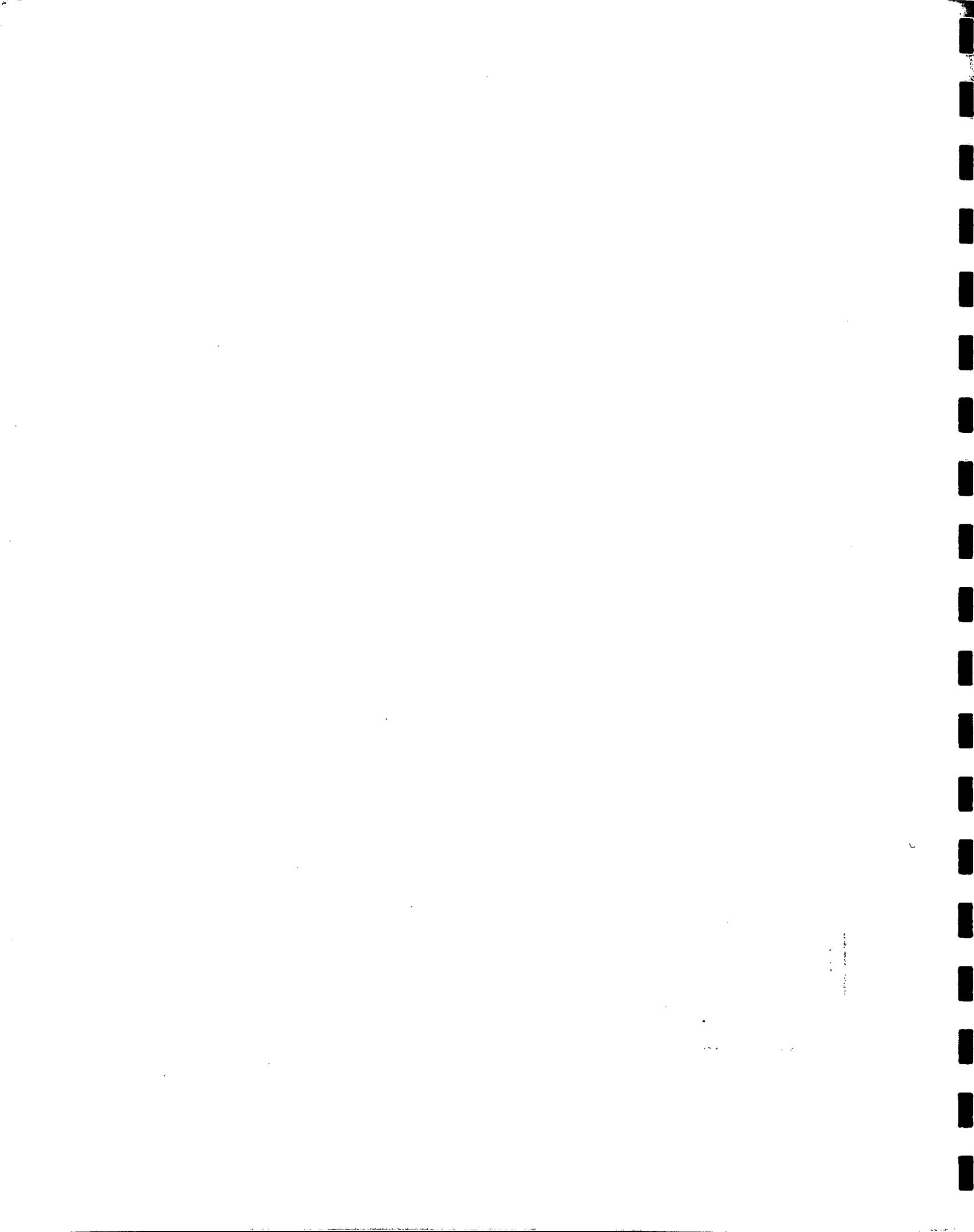
Sincerely,
BARKER LEMAR ENGINEERING CONSULTANTS

Helga C. Mayhew
Helga C. Mayhew
Project Manager

Christine L. Collier
Christine L. Collier, P. E.
Senior Project Manager

cc: Addressee
Mr. Virgil Anderson, Anderson Excavating
IDNR Field Office #4
File

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BARKER LEMAR
ENGINEERING CONSULTANTS

**2007 ANNUAL WATER QUALITY REPORT
CARTER LAKE C & D LANDFILL (CLOSED)
CARTER LAKE, IOWA**

**PERMIT No. 78-SDP-02-80C
PROJECT No. ANDEX 07101
NOVEMBER 2007**



I hereby certify that this engineering document was prepared by me or under my direct personal supervision and that I am a duly licensed Professional Engineer under the laws of the State of Iowa.

Christine L. Collier

Date: 11/29/07

Christine L. Collier, P.E.

License No. 17963

My license renewal date is December 31, 2007

Pages or sheets covered by this seal:

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1.0 INTRODUCTION

BARKER LEMAR ENGINEERING CONSULTANTS (BARKER LEMAR), on behalf of our client, Anderson Excavating Company, has completed the required groundwater sampling at the Carter Lake C & D Landfill. This report has been prepared in general accordance with the requirements of Iowa Administrative Code (IAC) 567-114(455B) and additional IDNR requirements. This report summarizes the 2007 site groundwater monitoring program and provides analysis of the data collected.

1.1 BRIEF HISTORY OF THE SITE

The site is a closed private construction and demolition (C&D) landfill located at the intersection of 13th Street and Locust Street in Carter Lake, Iowa. The site was used as a C&D landfill from 1980 through 1989. The site has since been covered and vegetated with grass and alfalfa. The landfill site covers approximately 20 acres, of which approximately 7 acres have been used as a landfill. The closure permit was issued on May 1, 1996.

1.2 GEOLOGY OF THE SITE

The *Hydrogeologic Investigation Report* dated July 26, 1995, prepared by Geotechnical Services Inc. provided the following geological setting:

The site is situated in the flood plain between Carter Lake and the Missouri River. This area is characterized by alluvial bedding plains consisting of sandy and silty clays with sand seams.

The near surface strata consist of fill; primarily consisting of silty sand, mixed with wood and brick pieces. Blow counts for the split spoon sampler indicated this strata to be well compacted. The fill extends to approximately 15 feet below grade. Alluvium consisting of silty clay was identified below the fill and was found to be saturated with groundwater and showed less consistency than the surface fill. The alluvium changed to fine to well graded sand at a depth of 20-25 feet below grade. Clay lenses were found to be interbedded within the sandy alluvium. The fine grained alluvial sand encountered at the site extended to depths in excess of 90 feet. Bedrock was not encountered in any of the soil borings performed at the site.

1.3 HYDROLOGY OF THE SITE

The above-referenced Hydrogeological Investigation Report provided the following hydrogeologic setting:

The near surface groundwater was found to be approximately 10-15 feet below grade. Well clusters were installed at the site with the well screens at 5-20 feet below grade, 45-55 feet below grade, and 75-85 feet below grade. Monitoring wells forming each individual well cluster exhibited the same static water levels: therefore, the surficial aquifer beneath the site appears to be extending to depths in excess of 90 feet below grade. These observations are consistent with the data obtained from the Geologic Survey of Omaha, Council Bluffs (1968).

The local groundwater flow direction at the site was found to be in southeasterly direction near the surface and northeasterly at 50 feet below the groundwater table. The proximity of Carter Lake and the Missouri River appears to have influenced the groundwater flow direction at the site.

Slug tests were performed to determine the hydraulic conductivity of the water bearing strata beneath the site. Whereas, the near surface clayey fill, as well as the sandy alluvial aquifer, exhibited rapid groundwater recharge; distinct differences were observed in the rate of recharge from both of these water bearing units. The fine grained sandy aquifer failed to show any draw down when the groundwater was withdrawn from the monitoring well at a rate of 15 gallons per minute. Due to this extremely rapid recharge, slug test data could not be gathered from any of the deeper monitoring wells. The hydraulic conductivity for the monitoring wells screened partially in the near surface clays, was found to be in the range of 0.40 – 1.04 m/d.

The installation of monitoring wells at the site resulted in three well clusters located to the east, west and south of the site. The vertical groundwater flow gradient was calculated by comparing the groundwater levels in the individual wells of each well cluster. The vertical groundwater flow gradient ranged from 0.019 to 0.055 ft/ft upwards and 0.052 ft/ft downwards.

1.4 PREVIOUS LAND USE

The Carter Lake C&D Landfill is located within the city limit of Carter Lake. Prior land use information has not been obtained. However, the 1960 IDOT aerial photograph providing coverage of the site was reviewed for the *Preliminary Groundwater Assessment* dated April 8, 1998, prepared by **BARKER LEMAR**. The following is an excerpt from the report:

In the 1960 aerial photograph, the site appears to be covered with small vegetation. Trees appear to be present around the perimeter of the property and in the northwest corner. Objects typical of an auto salvage yard appear to be present to the west of the site. Trees and brush along with some small structures are present to the east of the site. Trees and brush surrounding a large open area are present to the south of the site. Trees and brush along with some small structures are present to the north of the site.

1.5 SOLID WASTE STREAMS

The site received construction and demolition waste from 1980 to 1989.

1.6 REPORT CONTENTS

Sampling was performed in general accordance with Iowa Administrative Code (IAC) Section 114.26(4) and the provisions identified in the landfill permit. This report addresses water quality data collected during the 2007 sampling event and discusses the following items:

- Changes to the groundwater monitoring system since the Fall 2006 Annual Water Quality Report;
- Observations made during the collection of groundwater and surface water samples;
- Results of the physical parameters measured during sample collection;
- Changes or maintenance needed in the monitoring system;
- The statistical treatment and evaluation of the chemical data;
- Evaluation of potential groundwater mounding and impacts on monitoring wells;
- Evaluation of upgradient groundwater and surface water monitoring points;
- Evaluation of potential leachate migration as detected at groundwater monitoring wells;
- Evaluation of potential impact of the landfill on surface water quality; and
- Recommendations for future monitoring.

The report also provides a summary listing of analytical data, statistical computation results, graphs of statistical exceptions, and a digital copy of the data.

2.0 FIELD ACTIVITIES AND PROCEDURES

Groundwater monitoring wells were developed and sampled by **BARKER LEMAR** personnel on October 17, 2007. This activity represents the routine annual sampling event for 2007. Water samples from seven (7) groundwater monitoring wells were collected during this event. The surface monitoring point was dry during the 2007 sampling event.

Sampling forms for the 2007 sampling event are included in Appendix A. The general field measurement and sampling procedures used are outlined below:

- Static groundwater levels and total well depths were measured using an electronic water level indicator.
- Groundwater wells were purged of approximately three well volumes or until dry using dedicated Waterra® development/sampling pumps and/or dedicated bailers. Groundwater elevations were measured before and after well development.

- Field measurements of pH, temperature, and specific conductance were collected during groundwater monitoring well development and used as indicators of well conditions prior to sample collection.
- Groundwater samples were collected by using Waterra® pumps and/or dedicated hand bailers, and by transferring the samples into laboratory-prepared containers. Hand bailers were used to facilitate collection of water samples from the surface point. Samples collected for dissolved metals analysis were field-filtered using 0.45 micron filters.
- Groundwater samples were submitted for laboratory analysis under chain-of-custody procedures. Analysis was performed as indicated in the Hydrologic Monitoring System Plan (HMS), permit Amendment #2 dated March 17, 2000 indicating samples should be analyzed for the parameters listed in IAC 567 Sections 114.26(4)(e) and (f), and the provisions identified in the landfill permit.

3.0 MONITORING SYSTEM

The groundwater monitoring system in-place at the site is comprised of seven (7) monitoring wells (MW-1, MW-3, MW-4, MW-5, MW-6, MW-7R, and MW-8) and one (1) surface water monitoring point (SW-1). Figure 1 shows the location of the monitoring system points. The function as an upgradient, background, or downgradient sampling location for the water table and deep flow groundwater and a surface water monitoring point is depicted in Figure 1.

3.1 GROUNDWATER MONITORING SYSTEM

Two groundwater regimes (the water table aquifer and the deep flow) are monitored by the corresponding monitoring wells as shown in Table 1.

TABLE 1
MONITORING WELL NETWORK

REGIME	MONITORING WELLS
Aquifer 1 (Water Table)	Upgradient: MW-7R Downgradient: MW-1, MW-3, MW-5,
Aquifer 1 (Deep Flow)	Upgradient: MW-4, MW-6 Downgradient: MW-8

3.2 SURFACE WATER MONITORING POINTS

A surface water monitoring point, SW-1 has been established for the site at the southeast corner of the landfill. It is a drainage ditch that collects the majority of the surface water run-off from the site. The location of this point is shown on Figure 1.

4.0 MONITORING SYSTEM PERFORMANCE EVALUATION

The hydrologic monitoring system was re-evaluated to determine the reliability of the performance of the monitoring points based on the following tasks.

- The high and low groundwater levels were compared to well depth/screened interval.
- The frequency of the non-flowing surface water sampling point was evaluated.
- Water level conditions in the monitoring wells were reviewed to evaluate possible changes in the hydrologic setting/flow paths due to landfilling activities.
- Well depths were measured to evaluate integrity and siltation.
- A visual inspection of well integrity was performed during the sampling event.

4.1 WATER LEVEL MEASUREMENTS

The results of the water level measurements and well depth measurements are shown in Table 2 (Summary of Groundwater Levels and Well Performance) on the following page. The October 2007 data indicated that groundwater levels ranged from 965.25 feet above mean sea level (ft amsl) in MW-8 to 972.12 ft amsl in MW-1. Comparing the water levels recorded during the last two sampling events, the fluctuations ranged from an increase of 0.49 ft in MW-3 and MW-7R to 2.06 ft in MW-1 with all wells showing an increase. Water levels in the monitoring wells have been sufficient to yield ground water samples during the 2007 sampling event.

The monitoring wells in the Aquifer 1 (water table) were observed to have piezometric levels within the screened interval in the 2007 sampling event. The monitoring wells in the Aquifer 1 (deep flow) were observed to have piezometric levels above the screened interval in the 2007 sampling event, as expected for wells monitoring deep flow.

4.2 GROUNDWATER FLOW

Groundwater contours were determined for Aquifer 1 (water table and deep flow) by using water elevation data collected by **BARKER LEMAR** personnel on October 17, 2007. The groundwater contours for the Aquifer 1, water table and deep flow are presented in Figures 2 and 3, respectively.

Review of the Aquifer 1 (water table) groundwater flow pattern indicates that in October 2007 the general flow direction of this aquifer (water table) was in a southeasterly direction with a gradient of approximately 0.009 ft/ft.

TABLE 2
SUMMARY OF GROUNDWATER LEVELS AND WELL PERFORMANCE
CARTER LAKE C & D LANDFILL (Closed)
CARTER LAKE, IOWA
PERMIT NO. 78-SDP-02-80C
PROJECT NO. ANDEX 07101

WELL	TOC	TOS	TD	DATUM	DATE OF MEASUREMENT	
					October 11, 2006	October 17, 2007
MW-1	985.16	977.0	23.5	GROUNDWATER LEVEL	15.10	13.04
				GROUNDWATER ELEVATION	970.06	972.12
				MEASURED WELL DEPTH	20.6	20.7
MW-3	986.30	978.0	23.5	GROUNDWATER LEVEL	19.05	18.56
				GROUNDWATER ELEVATION	967.25	967.74
				MEASURED WELL DEPTH	21.0	21.2
MW-4	985.66	935.6	58.4	GROUNDWATER LEVEL	18.45	17.93
				GROUNDWATER ELEVATION	967.21	967.73
				MEASURED WELL DEPTH	58.3	58.5
MW-5	985.15	977.9	23.8	GROUNDWATER LEVEL	18.25	16.80
				GROUNDWATER ELEVATION	966.90	968.35
				MEASURED WELL DEPTH	23.7	23.8
MW-6	984.99	938.1	56.9	GROUNDWATER LEVEL	18.05	16.98
				GROUNDWATER ELEVATION	966.94	968.01
				MEASURED WELL DEPTH	56.7	56.5
MW-7R	986.13	978.0	23.1	GROUNDWATER LEVEL	14.90	14.41
				GROUNDWATER ELEVATION	971.23	971.72
				MEASURED WELL DEPTH	23.1	23.2
MW-8	982.05	934.1	56.9	GROUNDWATER LEVEL	16.80	16.27
				GROUNDWATER ELEVATION	965.25	965.78
				MEASURED WELL DEPTH	56.5	56.5

Notes:

All measurements in feet.

NA - Data are not available.

TOC - Top of casing elevation, reference for water level measurements.

TOS - Top of screen elevation.

TD - Total depth (as originally reported).

On October 11, 2006, the casings for MW-5 and MW-6 were repaired.

8" were removed from MW-5 casing: 985.82' - 0.67' = 985.15'. New well depth is 23.84'.

5.5" were removed from MW-6 casing: 985.45' - 0.46' = 984.99'. New well depth is 56.90'.

The groundwater flow direction for the potentiometric surface of the Aquifer 1 (deep flow) has been observed to exhibit a flow direction in a northerly direction across the site with a general gradient of 0.004 ft/ft.

4.3 WELL SILTATION

The monitoring well depths measured by **BARKER LEMAR** personnel in the 2007 sampling event were within 0.4 foot of the installed depth in five of the seven wells. Monitoring wells MW-1 and MW-3 were 2.8 and 2.3 feet shallower, respectively, than the installed depth during the 2007 sampling event. Based on the ability of the dedicated pumping system to remove accumulated sediment, it appears unlikely that siltation will adversely impact the groundwater monitoring points at this site.

4.4 SAMPLING POINT OBSERVATIONS

In general, problems regarding the integrity of the monitoring wells or sampling points were not noted.

4.5 FREQUENCY OF NON-FLOWING SAMPLING POINTS

SW-1 was not flowing during the 2007 sampling event. As this is a drainage ditch for storm water leaving the site, flow will only be present during or shortly after storm events.

4.6 DISCUSSION OF POTENTIAL GROUNDWATER MOUNDING

Figure 2 shows the contours of the upper water table aquifer. There are no piezometers at this site; therefore, this section does not apply.

4.7 DISCUSSION OF UPGRAIDENT MONITORING POINTS

Upgradient Groundwater Monitoring Points

The upgradient monitoring well for Aquifer 1 (water table) regime is MW-7R. The water table contours as shown on Figure 2 indicate that the groundwater level in MW-7R is at a higher elevation than the interpolated groundwater levels within the adjacent portion of the waste boundary. In addition, comparing the water quality data for MW-7R with the downgradient wells, significant degradation of the groundwater quality due to leachate influence has not been observed. The following is a summary of the upgradient monitoring well for Aquifer 1 (water table):

No statistical exceedances were measured in upgradient monitoring point **MW-7R** during the 2007 sampling event. Water quality data for this well is available beginning in October 2001. New maximum concentrations were observed for chemical oxygen demand (COD) and specific conductance in the 2007 sampling event. A new minimum concentration was observed for chloride in the 2007 sampling event. No other new concentration maximums or minimums were observed in 2007. A generally increasing concentration trend for specific conductance was noted in the data beginning in 2003. No other established trends in concentrations were noted in the remaining analytes.

The upgradient monitoring wells for Aquifer 1 (deep flow) regime are MW-4 and MW-6. The deep flow water table elevations as shown on Figure 3 indicate that the groundwater levels in MW-4 and MW-6 are at a higher elevation than the groundwater levels in the downgradient monitoring well MW-8. In addition, comparing the water quality data for MW-4 and MW-6 with the downgradient monitoring well for this regime MW-8, degradation of the groundwater quality due to leachate influence has not been observed. The following is a summary of the upgradient monitoring wells for Aquifer 1 (deep flow):

No statistical exceedances were measured in upgradient monitoring well **MW-4** during the 2007 sampling event. Water quality data for this well is available beginning in October 1996. No new concentration maximums or minimums were observed in the 2007 sampling event. No established trends in concentrations were noted in the analytes.

No statistical exceedances were measured in upgradient monitoring well **MW-6** during the 2007 sampling event. Water quality data for this well is available beginning in October 1996. A new maximum total organic halogens (TOH) concentration was observed in the 2007 sampling event. No other new concentration maximums or minimums were observed in 2007. A generally increasing specific conductance concentration trend was noted in the data beginning in 2003. No other established trends in concentrations were noted in the remaining analytes.

Upgradient Surface Water Monitoring Point

An upgradient surface water monitoring point has not been established for this site. There is only one surface water monitoring point, SW-1 (downgradient) located at the southeast corner of

the landfill. This point is a drainage ditch that collects the majority of the surface water run-off from the site during precipitation events.

4.8 MONITORING SYSTEM RECOMMENDATIONS

Hydrologic monitoring at the site has been conducted in accordance with the approved Hydrologic Monitoring System Plan (HMSP) dated April 15, 1996 and revisions dated April 25, 1996, as prepared by **BARKER LEMAR**, the special provisions identified in the landfill permit, Permit Amendment #1, and Permit Amendment #2. No recommendations regarding modifications to the hydrologic monitoring system are needed as of the date of this report.

5.0 DATA EVALUATION METHODS

The statistical evaluation of the chemical data was completed in accordance with IAC 567 Section 114.26(6).

5.1 WELL GROUPING

The groundwater regimes discussed in Section 3.1 were evaluated separately. Upgradient groundwater monitoring points were selected from each group for statistical comparison. The selection of upgradient groundwater monitoring points was based on the "Preliminary Groundwater Assessment", submitted by **BARKER LEMAR** in April 1998.

5.2 CONTROL LIMITS

Once the groupings were completed, the mean, standard deviation, and control limits were calculated for each of the chemical parameters in the upgradient monitoring point. The control limit represents the limit at which a statistical exceedance beyond the background concentration has occurred. For the purpose of this evaluation, the control limits were defined as the mean of the concentrations for the upgradient monitoring point plus/minus two times the standard deviation for each parameter. The lower control limit was only used for evaluation of pH levels.

5.3 METHOD DETECTION LIMITS

Many of the parameters were observed at concentrations less than the method detection limits (MDLs). The mean, standard deviation, and control limits were computed by utilizing the reporting limit value in the computations (i.e., <0.05 becomes 0.05). In situations in which each of the upgradient monitoring point concentrations was below the MDLs, the standard deviation

and control limits were not calculated. It should be noted that in some cases in which control limits were not calculated for the aforementioned reason, the measured downgradient concentration exceeded the upgradient mean.

5.4 REGULATORY ACTION LIMITS

In addition to evaluating the concentration in comparison to upgradient control limits, the concentrations were also compared to current United States Environmental Protection Agency (USEPA) Maximum Contaminant Levels (MCLs), Negligible Risk Levels (NRLs), and Health Advisory Levels (HALs). IDNR guidance documents define the "action level" for groundwater as the following:

"As defined by 567 - 133.2 (455B, 455E), action level means the HAL, if one exists. If there is no HAL, then the NRL, if one exists. If there is no HAL or NRL, then the MCL. If there is no HAL, NRL, or MCL, an action level may be established by the department based on current technical literature and recommended guidelines of the USEPA and recognized experts, on a case-by-case basis."

The dissolved arsenic concentration in upgradient monitoring wells MW-4, MW-6, and MW-7R exceeded the MCL of 0.01 mg/L in the 2007 sampling event. No other exceedances of regulatory action levels were noted in 2007.

6.0 EVALUATION OF WATER QUALITY PARAMETERS

Section 6.1 provides a summary of statistical exceedances, upgradient mean exceedances, new maximum and minimum concentrations, and generally observed trends for each downgradient monitoring point. Please note, for parameters with insufficient historical data, typically four data points or less, discussions in regard to minimum/maximum concentrations or generally observed trends are not included.

The historical analytical results of the downgradient monitoring wells are presented in Appendix B (Summary of Groundwater Chemistry). The analytical data report for October 2007 is included in Appendix C. Parameters were graphed in relation to the current mean and standard deviation for each group. Results that exceeded the current upgradient control limits are presented in the Exceedance Tables in Appendix D. The graphs depicting the changes of each parameter in each downgradient monitoring point are included in Appendix E. Note, some graphs may depict

values that exceed the upper control limit and are not included in the summary of exceedances table. These values are not reported as exceedances due to the upper control limit being less than the detection level of that parameter's test method.

6.1 MONITORING WELL SUMMARY

The downgradient monitoring wells for the Aquifer 1 (water table) regime are MW-1, MW-3, and MW-5. Following are summaries of the downgradient wells for this regime:

Statistical exceedances were measured in monitoring well **MW-1** for COD, ammonia nitrogen, and TOH during the 2007 sampling event. Water quality data for this well is available beginning in October 1996. A new maximum concentration was observed for COD in the 2007 sampling event. A new minimum concentration was observed for chloride in the 2007 sampling event. No other new concentration maximums or minimums were observed in 2007. Erratic, yet generally decreasing chloride and dissolved iron concentration trends were noted in data beginning in 2000 and 1999, respectively. No other established trends in concentrations were noted in the remaining analytes.

A statistical exceedance was measured in monitoring well **MW-3** for chloride during the 2007 sampling event. Water quality data for this well is available beginning in October 1996. No new concentration maximums or minimums were observed in the 2007 sampling event. A generally increasing specific conductance concentration trend was noted in data beginning in 2003. No other established trends in concentrations were noted in the remaining analytes.

A statistical exceedance was measured in monitoring well **MW-5** for TOH during the 2007 sampling event. Water quality data for this well is available beginning in October 1996. No new concentration minimums or maximums were observed in the 2007 sampling event. A generally increasing concentration trend for specific conductance was noted in data beginning in 2003. No other established trends in concentrations were noted in the remaining analytes.

The downgradient monitoring wells for the Aquifer 1 (deep flow) regime is MW-8. Following is a summary of the downgradient well for this regime:

No statistical exceedances were measured in monitoring well **MW-8** during the 2007 sampling event. Water quality data for this well is available beginning in October 1996. A new minimum concentration was observed for chloride in the 2007 sampling event. No other new concentration maximums or minimums were observed in 2007. A generally decreasing concentration trend for chloride was noted in data beginning in 1998. A generally increasing concentration trend for specific conductance was noted in data beginning in 2003. No established trends in concentrations were noted in the remaining analytes.

The surface water monitoring point **SW-1** has been dry. No data is available for this monitoring point.

7.0 SUMMARY AND RECOMMENDATIONS

7.1 POTENTIAL LEACHATE MIGRATION

A summary of the 2006 and 2007 exceedances computed for the downgradient monitoring wells are shown in Tables 3A and 3B, respectively.

**TABLE 3A
2006 SUMMARY OF STATISTICAL EXCEEDANCES**

Parameter	MW-1	MW-3	MW-5
Chloride		X	
COD	X		
Ammonia Nitrogen	X		
Total Organic Halogens	X		X

**TABLE 3B
2007 SUMMARY OF STATISTICAL EXCEEDANCES**

Parameter	MW-1	MW-3	MW-5
Chloride		X	
COD	X		
Ammonia Nitrogen	X		
Total Organic Halogens	X		X

No changes in water quality from last year were noted in 2007. Statistical exceedances remained the same in number of analytes and in number of wells.

Monitoring well MW-1 indicated erratic, yet generally decreasing concentration trends for chloride and dissolved iron beginning in 2000 and 1999, respectively. Monitoring wells MW-3, MW-5, MW-6, MW-7R and MW-8 indicated a generally increasing concentration trend for specific conductance beginning in 2003. Monitoring well MW-8 indicated a generally decreasing concentration trend for chloride beginning in 1998. The data should continue to be reviewed as new data becomes available to determine if the parameter trend observations are consistent.

Overall, concentrations of indicator parameters have remained relatively consistent within the range of previous measurements. A complete analysis of the historical data can be found in Appendices B and E. Historical trends should be considered during the evaluation of the exceedance values.

The MCL for dissolved arsenic was exceeded in the upgradient monitoring wells MW-4, MW-6, and MW-7R in the 2007 sampling event, which is two (2) less occurrences than in 2006. The MCL exceedances for dissolved arsenic have been evident at this landfill since 1996. Based on the widespread occurrence of dissolved arsenic in both upgradient (exceeding the MCL) and downgradient monitoring wells, it appears that the Carter Lake C&D Landfill is not the arsenic source.

The 0.01 mg/L arsenic concentration contour for the 2007 sampling event results are depicted for water table wells on Figure 4 and for deep flow wells on Figure 5, as requested by the IDNR correspondence dated November 13, 1998. The upgradient monitoring well for Aquifer 1 (water table), MW-7R as shown on Figure 2, indicated more than three times higher arsenic concentrations to the wells located downgradient. MW-1, MW-3, and MW-5 are situated downgradient of Aquifer 1 (water table) groundwater flow direction and showed arsenic levels less than the MCL in the 2007 sampling event. Likewise, upgradient monitoring wells, MW-4 and MW-6, for Aquifer 1 (deep flow) indicated about three to five times higher arsenic concentrations than the downgradient well MW-8. MW-8 showed an arsenic level below the MCL during the 2007 sampling event. This is an indication that the Carter Lake C&D Landfill is not the source of the arsenic impact. Arsenic contamination investigation will be continued in future Annual Water Quality Reports.

7.2 POTENTIAL RECEPTORS

Pursuant to the additional IDNR requirements, if MCLs are exceeded (at any groundwater monitoring point), information on potential receptors should be provided. As mentioned above, the MCL for dissolved arsenic was exceeded in upgradient monitoring wells MW-4, MW-6, and MW-7R. Potential receptors downgradient from the landfill include Carter Lake, the Missouri River, and residential houses. However, as discussed, it is believed the arsenic is originating upgradient from the landfill.

7.3 IMPACT OF THE LANDFILL ON SURFACE WATER QUALITY

Surface water monitoring point SW-1 has been dry since the beginning of the sampling events.

7.4 CONCLUSIONS AND RECOMMENDATIONS FOR FUTURE MONITORING

Based on these results, **BARKER LEMAR** recommends continued routine annual water sampling for the parameters listed in IAC Chapter 114.26(4)(e) and (f) and for dissolved arsenic as stated in the current closure permit and permit Amendment #2.

8.0 GENERAL COMMENTS

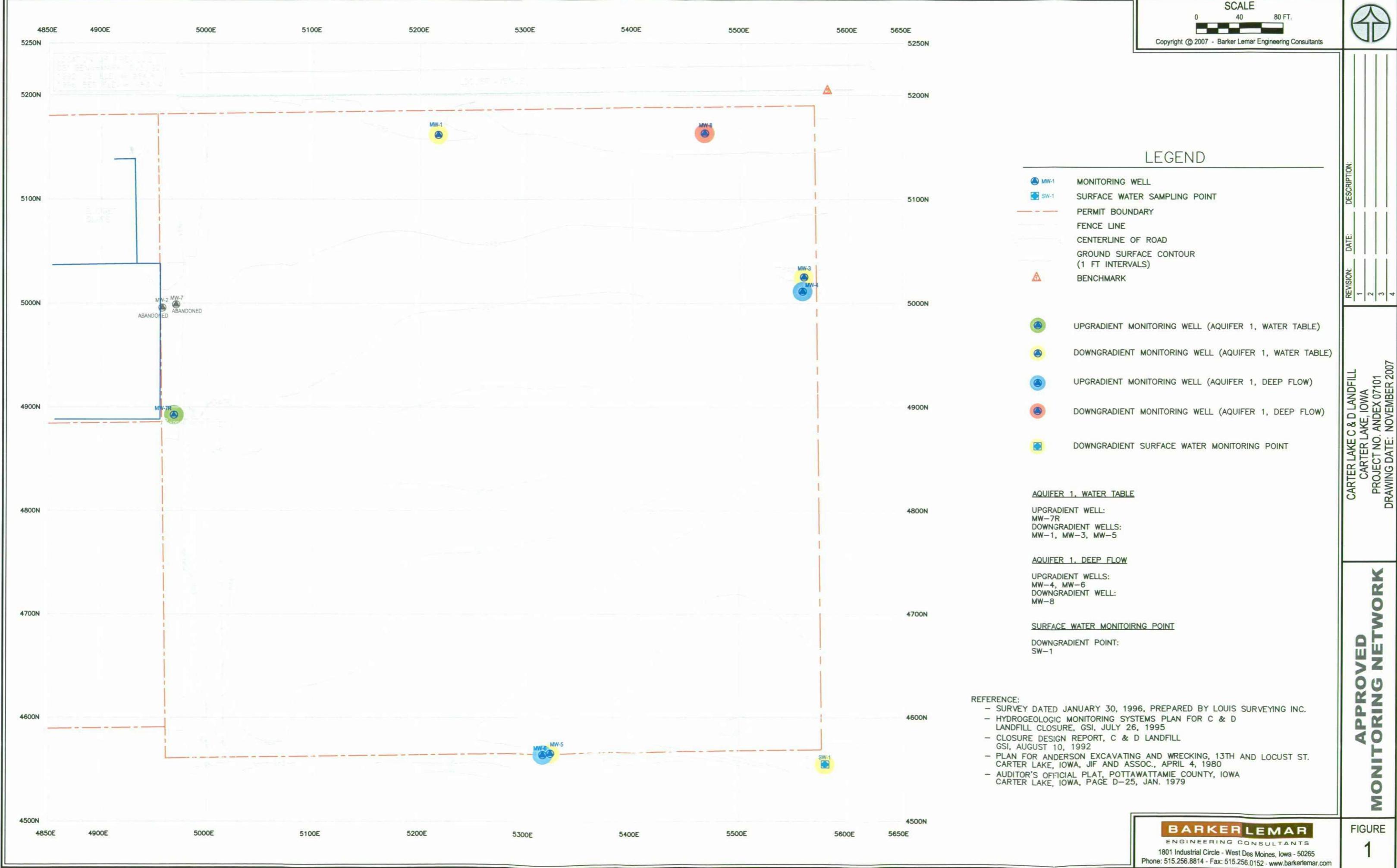
The analysis and opinions expressed in this report are based upon data obtained from the samples collected at the indicated locations and from any other information discussed in this report. This report does not reflect any variations in subsurface stratigraphy, hydrogeology, or chemical concentrations that may occur between sampling locations or across the site. Actual subsurface conditions may vary and may not become evident without further exploration.

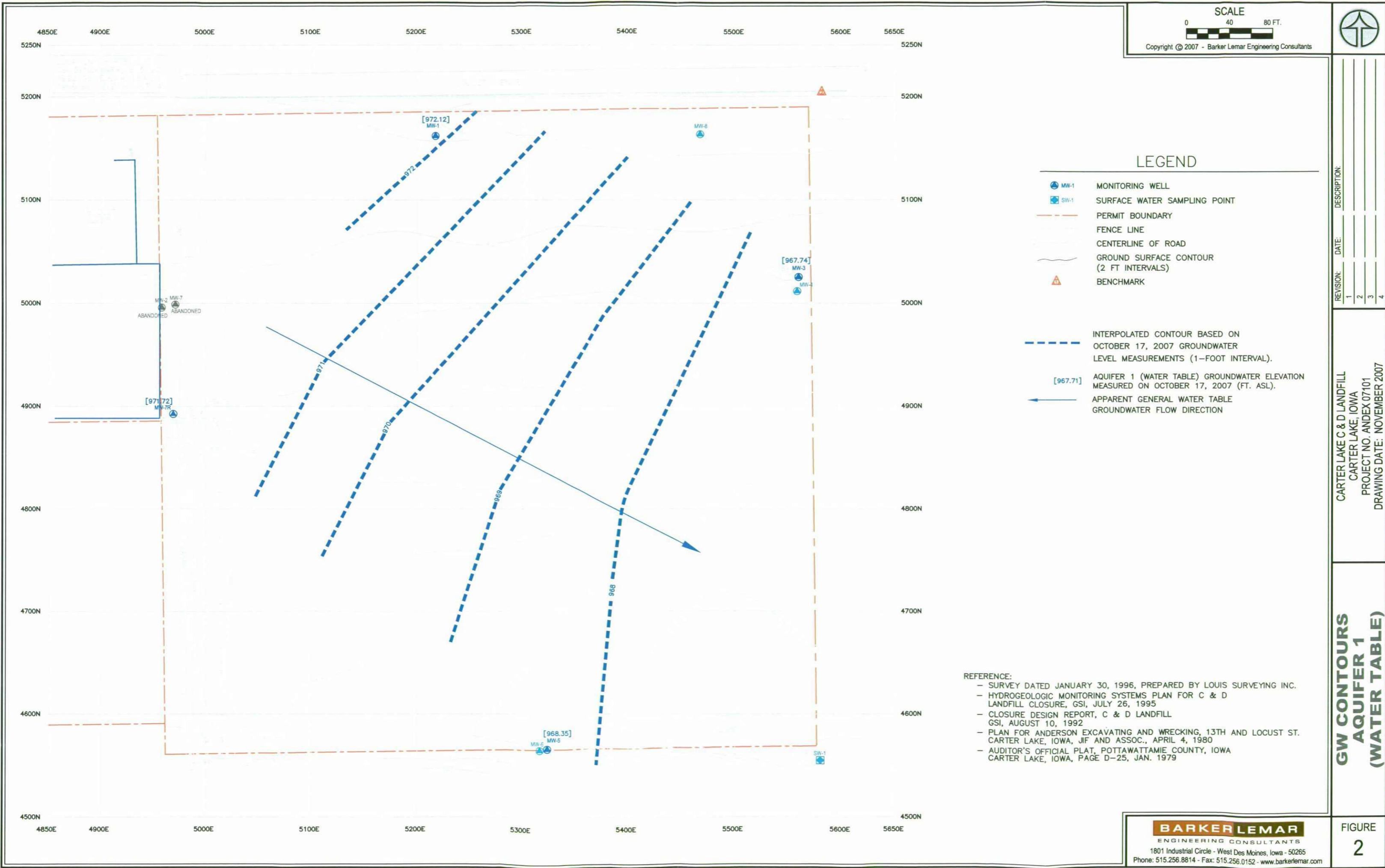
BARKER LEMAR has prepared this report for the exclusive use of our client for the specific application to the project discussed. No warranty is expressly stated or implied in this report. **BARKER LEMAR** has relied upon information furnished by others as noted in the report, and **BARKER LEMAR** accepts no responsibility for any deficiency, misstatements, or inaccuracy in this report as a result of misstatements, omissions, misrepresentations, fraudulent, or inaccurate information or data provided by others.

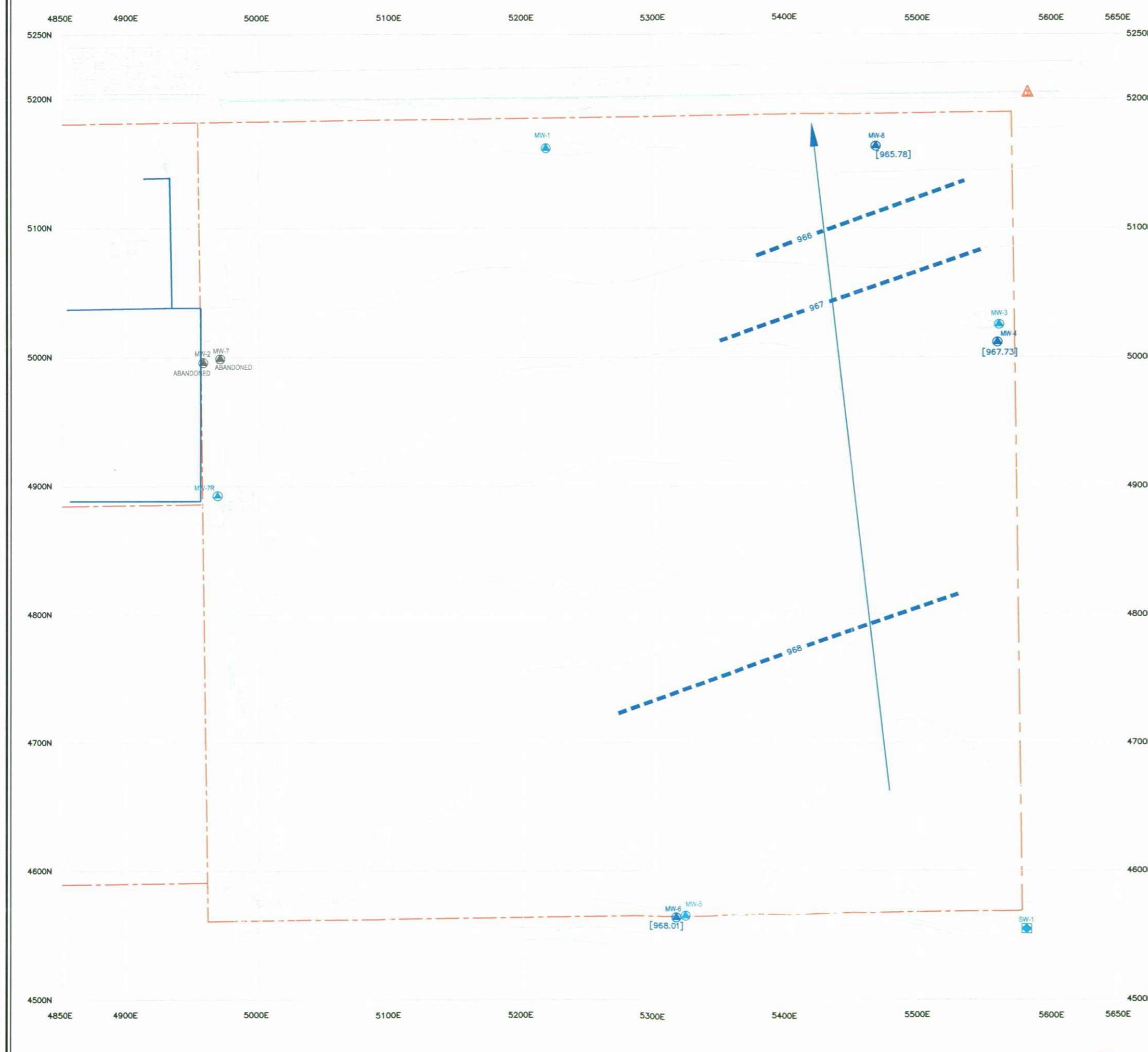
9.0 REFERENCES

1. Geotechnical Services Inc., *Hydrogeologic Investigation Report*. July 26, 1995.
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3. Barker Environmental Services, Inc. *1997 Annual Water Quality Report, Carter Lake C&D Landfill (CLOSED)*. December 29, 1997.
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7. Barker, Lemar and Associates, Inc. *2000 Annual Water Quality Report, Carter Lake C&D Landfill (CLOSED)*. November 21, 2000.
8. **BARKER LEMAR ENGINEERING CONSULTANTS.** *2001 Annual Water Quality Report, Carter Lake C&D Landfill (CLOSED)*. November 26, 2001.
9. **BARKER LEMAR ENGINEERING CONSULTANTS.** *2002 Annual Water Quality Report, Carter Lake C&D Landfill (CLOSED)*. November 28, 2002.
10. **BARKER LEMAR ENGINEERING CONSULTANTS.** *2003 Annual Water Quality Report, Carter Lake C&D Landfill (CLOSED)*. November 24, 2003.
11. **BARKER LEMAR ENGINEERING CONSULTANTS.** *2004 Annual Water Quality Report, Carter Lake C&D Landfill (CLOSED)*. November 30, 2004.
12. **BARKER LEMAR ENGINEERING CONSULTANTS.** *2005 Annual Water Quality Report, Carter Lake C&D Landfill (CLOSED)*. November 30, 2005.
13. **BARKER LEMAR ENGINEERING CONSULTANTS.** *2006 Annual Water Quality Report, Carter Lake C&D Landfill (CLOSED)*. November 29, 2006.

FIGURES





**LEGEND**

- MW-1 MONITORING WELL
- SW-1 SURFACE WATER SAMPLING POINT
- PERMIT BOUNDARY
- FENCE LINE
- CENTERLINE OF ROAD
- GROUND SURFACE CONTOUR (1 FT INTERVALS)
- BENCHMARK

INTERPOLATED CONTOUR BASED ON
OCTOBER 17, 2007 GROUNDWATER
LEVEL MEASUREMENTS (1-FOOT INTERVAL).

AQUIFER 1 DEEP FLOW GROUNDWATER ELEVATION
MEASURED ON OCTOBER 17, 2007 (FT. ASL).

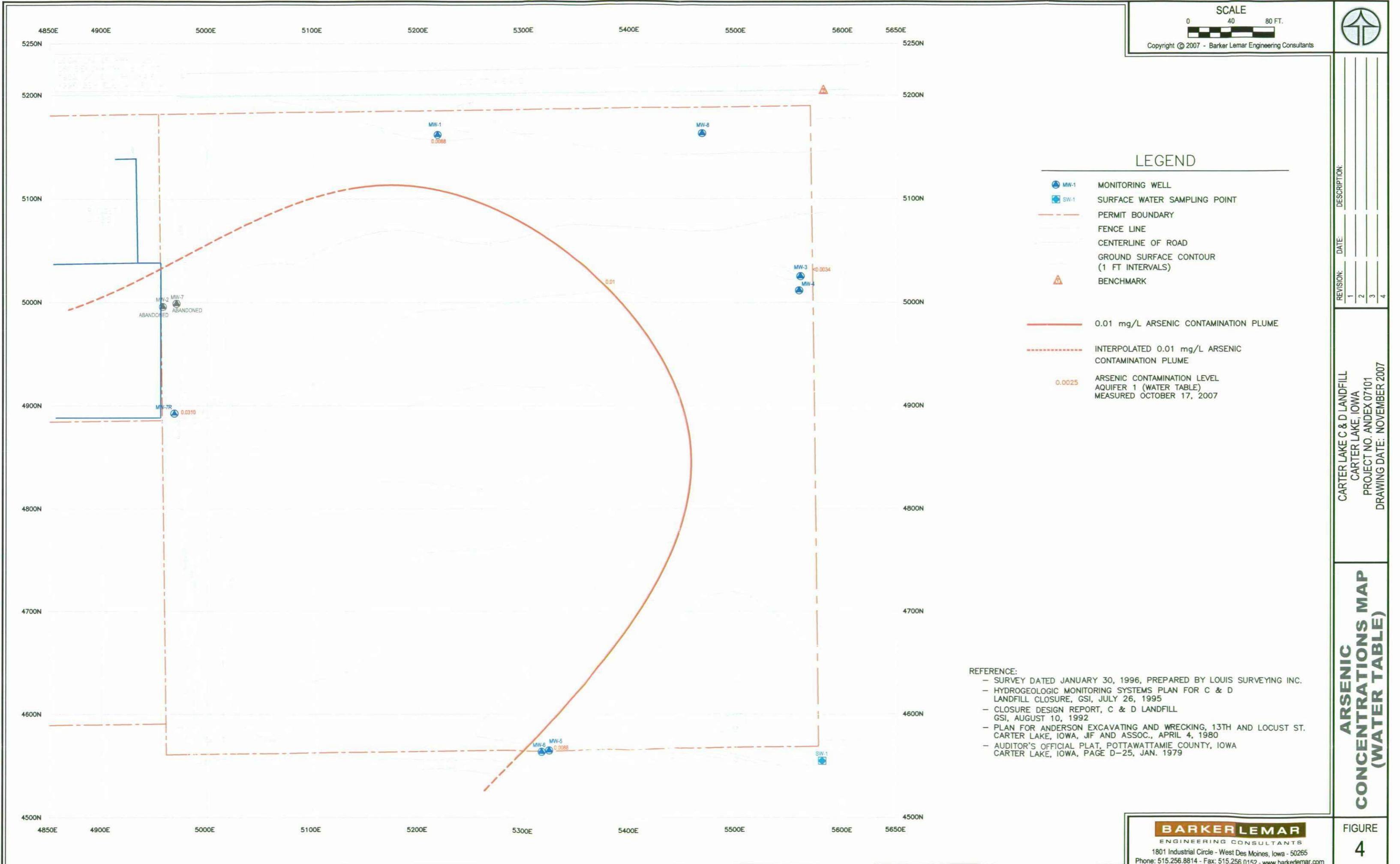
APPARENT GENERAL DEEP FLOW
GROUNDWATER FLOW DIRECTION

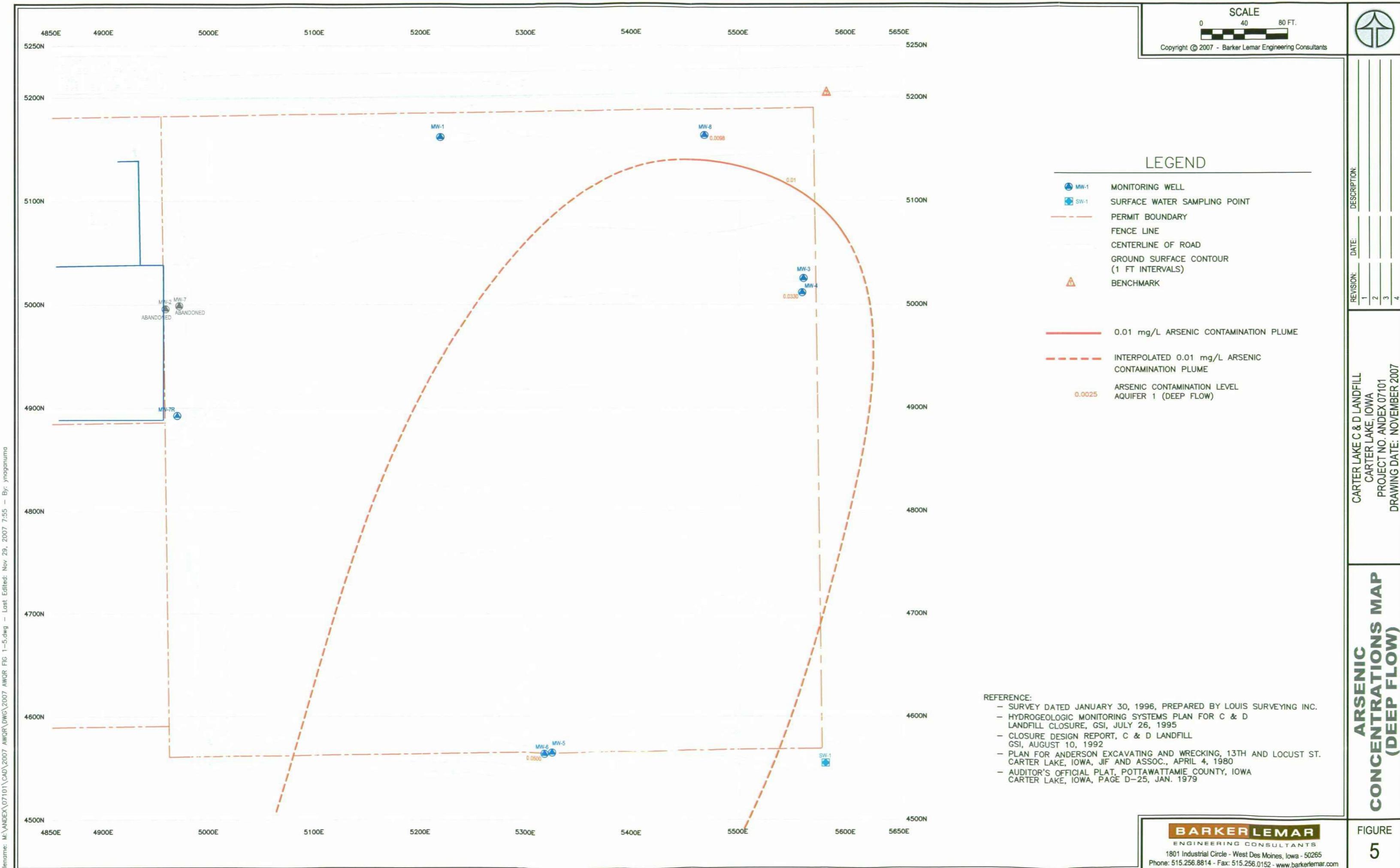
REFERENCE:

- SURVEY DATED JANUARY 30, 1996, PREPARED BY LOUIS SURVEYING INC.
- HYDROGEOLOGIC MONITORING SYSTEMS PLAN FOR C & D LANDFILL CLOSURE, GSI, JULY 26, 1995
- CLOSURE DESIGN REPORT, C & D LANDFILL GSI, AUGUST 10, 1992
- PLAN FOR ANDERSON EXCAVATING AND WRECKING, 13TH AND LOCUST ST. CARTER LAKE, IOWA, JIF AND ASSOC., APRIL 4, 1980
- AUDITOR'S OFFICIAL PLAT, POTTAWATTAMIE COUNTY, IOWA CARTER LAKE, IOWA, PAGE D-25, JAN. 1979

GW CONTOURS AQUIFER 1 (DEEP FLOW)

CARTER LAKE C & D LANDFILL
CARTER LAKE, IOWA
PROJECT NO. ANDEX 07101
DRAWING DATE: NOVEMBER 2007





APPENDIX A
FALL SAMPLING FORMS

LANDFILL GROUNDWATER SAMPLING DATA SHEET

Project Information

Project Name:	Anderson Carter Lake C&D Landfill
Project Location:	Carter Lake, Iowa
Project Number:	INDEX 07101
SLF Permit No.	78-SDP-2-80C
Weather Conditions:	59 degrees Fahrenheit, raining

Sampling Information

Date Sampled:	10/17/2007
Sampling Crew:	Jerry Barton
Equipment:	Water Level Heron
pH/Conductivity	Oakton

Well No.	Date	Wellhead Information				Boring Depth (ft)	Equipment See Note	Stabilized Conductivity (µS/cm)	Stabilized Temperature (°C)	Water Standing Water (Y/N)	Property Capped (Y/N)	Comments All time sampled
		Station	Measured Water Level (ft)	Young Depth (in)	Purge Volume (gals)							
MW-1	10/17/2007	13.04	20.7	10:15 AM	4	Dry	19.21	W	6.88	2,760	15.6	Y N New lock
MW-3	10/17/2007	18.56	21.2	10:35 AM	2	Dry	21.07	DB	6.85	3,000	15.7	Y N New lock
MW-4	10/17/2007	17.93	58.5	11:00 AM	20	19.08	19.02	W	7.14	2,280	14.8	Y N New lock
MW-5	10/17/2007	16.80	23.8	11:40 AM	5	Dry	20.92	W	6.87	2,670	16.9	Y Y Litter
MW-6	10/17/2007	16.98	56.5	12:00 PM	20	19.57	19.49	W	7.13	2,670	15.4	Y Y Litter
MW-7R	10/17/2007	14.41	23.2	9:00 AM	4	Dry	21.77	DB	6.87	2,620	15.7	Y N New lock
MW-8	10/17/2007	16.27	56.5	9:30 AM	20	16.38	16.38	W	7.14	2,580	14.1	Y N New lock
<hr/>												
Surface Water Point No.	Date	Point Width (in)	Point Depth (in)	Flowrate (Y/N)	Point Type (Y/N)	Water Standing Water (Y/N)	Groundwater Flowing Discard (Y/N)	Stabilized Conductivity (µS/cm)	Stabilized Temperature (°C)	Water Standing Water (Y/N)	Odor (Y/N)	Comments All time sampled
SW-1	10/17/2007	NA	NA	NA	Y	N	N	NA	NA	NA	NA	Dry

Note 1: VALID TYPES - Bailer (B), Submersible (S), Watera (W), Vacuum Pump (V), Dedicated Bailer (DB), Other (describe in comments)

FORM FOR GROUNDWATER SAMPLING AND/OR GROUNDWATER ELEVATION MEASUREMENT

Site Name	<u>Anderson Carter Lake C&D Landfill</u>	Permit No.	<u>78-SDP-2-80C</u>
MW/Piezometer No.	<u>MW-1</u>	Upgradient	
		Downgradient	
			X

Name of Person Sampling Jerry Barton

A. MONITORING WELL/PIEZOMETER CONDITIONS

Well/Piezometer Capped?	<u>Yes</u>	Standing Water/Litter?	<u>No</u>
If NO, Explain			

B. GROUNDWATER ELEVATION MEASUREMENT (+/- 0.01 foot, MSL)

Top of Casing Elevation	<u>985.16</u>	feet	Ground Elevation (ft.)	<u>981.95</u>
Drilled Well Depth (ft.)	<u>23.5</u>	feet	Casing Dia. (in.)	<u>2.0</u>
Measured Well Depth (ft.)	<u>20.7</u>	feet		

Equipment Used Heron

Groundwater Level (+/- 0.01 foot below top of inner casing, MSL):

	Date	Time	Depth to Groundwater (ft)	Groundwater Elevation
Before Purging	<u>10/17/2007</u>	<u>10:15 AM</u>	<u>13.04</u>	<u>972.12</u>
After Purging			Dry	Dry
Before Sampling			<u>19.21</u>	<u>965.95</u>

C. WELL PURGING*

Quantity of Water Removed from Well (gallons)	<u>4</u>
No. of Well Volumes (based on current water level)	<u>3.2</u>
Was well pumped/bailed dry?	<u>Yes</u>

Equipment Used:

Bailer Type	<u>Not Used</u>	Dedicated Bailer?	<u>No</u>
Pump Type	<u>Waterra</u>	Dedicated Pump?	<u>Yes</u>

If not dedicated, method of cleaning _____

D. FIELD MEASUREMENTS*

Weather Conditions 59 degrees Fahrenheit, raining

Field Measurements (after stabilization):

Temperature	<u>15.6</u>	Units	<u>Celsius</u>
Equipment Used	<u>Oakton</u>		
pH	<u>6.88</u>	Units	<u>Standard Units</u>
Equipment Used	<u>Oakton</u>		
Spec.Conductance	<u>2,760</u>	Units	<u>uS/cm.</u>
Equipment Used	<u>Oakton</u>		

COMMENTS New lock

IDNR Form 542-1322

*Omit if only measuring groundwater elevations.

FORM FOR GROUNDWATER SAMPLING AND/OR GROUNDWATER ELEVATION MEASUREMENT

Site Name	<u>Anderson Carter Lake C&D Landfill</u>	Permit No.	<u>78-SDP-2-80C</u>
MW/Piezometer No.	<u>MW-3</u>	Upgradient	<u> </u>
		Downgradient	<u>X</u>

Name of Person Sampling Jerry Barton

A. MONITORING WELL/PIEZOMETER CONDITIONS

Well/Piezometer Capped?	<u>Yes</u>	Standing Water/Litter?	<u>No</u>
If NO, Explain	<u> </u>		

B. GROUNDWATER ELEVATION MEASUREMENT (+/- 0.01 foot, MSL)

Top of Casing Elevation	<u>986.30</u>	feet	Ground Elevation (ft.)	<u>983.00</u>
Drilled Well Depth (ft.)	<u>23.5</u>	feet	Casing Dia. (in.)	<u>2.0</u>
Measured Well Depth (ft.)	<u>21.2</u>	feet		

Equipment Used Heron

Groundwater Level (+/- 0.01 foot below top of inner casing, MSL):

	Date	Time	Depth to Groundwater (ft)	Groundwater Elevation
Before Purging	<u>10/17/2007</u>	<u>10:35 AM</u>	<u>18.56</u>	<u>967.74</u>
After Purging	<u> </u>	<u> </u>	<u>Dry</u>	<u>Dry</u>
Before Sampling	<u> </u>	<u> </u>	<u>21.07</u>	<u>965.23</u>

C. WELL PURGING*

Quantity of Water Removed from Well (gallons)	<u>2</u>
No. of Well Volumes (based on current water level)	<u>5</u>
Was well pumped/bailed dry?	<u>Yes</u>

Equipment Used:

Bailer Type	<u>Dedicated Bailer</u>	Dedicated Bailer?	<u>Yes</u>
Pump Type	<u>Not Used</u>	Dedicated Pump?	<u>No</u>

If not dedicated, method of cleaning

D. FIELD MEASUREMENTS*

Weather Conditions 59 degrees Fahrenheit, raining

Field Measurements (after stabilization):

Temperature	<u>15.7</u>	Units	<u>Celsius</u>
Equipment Used	<u>Oakton</u>		
pH	<u>6.85</u>	Units	<u>Standard Units</u>
Equipment Used	<u>Oakton</u>		
Spec.Conductance	<u>3,000</u>	Units	<u>uS/cm.</u>
Equipment Used	<u>Oakton</u>		

COMMENTS New lock

IDNR Form 542-1322

*Omit if only measuring groundwater elevations.

FORM FOR GROUNDWATER SAMPLING AND/OR GROUNDWATER ELEVATION MEASUREMENT

Site Name	<u>Anderson Carter Lake C&D Landfill</u>	Permit No.	<u>78-SDP-2-80C</u>
MW/Piezometer No.	<u>MW-4</u>	Upgradient	<u>X</u>
		Downgradient	

Name of Person Sampling Jerry Barton

A. MONITORING WELL/PIEZOMETER CONDITIONS

Well/Piezometer Capped?	<u>Yes</u>	Standing Water/Litter?	<u>No</u>
If NO, Explain	<hr/>		

B. GROUNDWATER ELEVATION MEASUREMENT (+/- 0.01 foot, MSL)

Top of Casing Elevation	<u>985.66</u>	feet	Ground Elevation (ft.)	<u>983.57</u>
Drilled Well Depth (ft.)	<u>58.4</u>	feet	Casing Dia. (in.)	<u>2.0</u>
Measured Well Depth (ft.)	<u>58.5</u>	feet		

Equipment Used Heron

Groundwater Level (+/- 0.01 foot below top of inner casing, MSL):

	Date	Time	Depth to Groundwater (ft)	Groundwater Elevation
Before Purging	<u>10/17/2007</u>	<u>11:00 AM</u>	<u>17.93</u>	<u>967.73</u>
After Purging	<u>[REDACTED]</u>	<u>[REDACTED]</u>	<u>19.08</u>	<u>966.58</u>
Before Sampling	<u>[REDACTED]</u>	<u>[REDACTED]</u>	<u>19.02</u>	<u>966.64</u>

C. WELL PURGING*

Quantity of Water Removed from Well (gallons)	<u>20</u>
No. of Well Volumes (based on current water level)	<u>3.0</u>
Was well pumped/bailed dry?	<u>No</u>

Equipment Used:			
Bailer Type	<u>Not Used</u>	Dedicated Bailer?	<u>No</u>
Pump Type	<u>Waterra</u>	Dedicated Pump?	<u>Yes</u>

If not dedicated, method of cleaning [REDACTED]

D. FIELD MEASUREMENTS*

Weather Conditions 59 degrees Fahrenheit, raining

Field Measurements (after stabilization):

Temperature	<u>14.8</u>	Units	<u>Celsius</u>
Equipment Used	<u>Oakton</u>		
pH	<u>7.14</u>	Units	<u>Standard Units</u>
Equipment Used	<u>Oakton</u>		
Spec.Conductance	<u>2,280</u>	Units	<u>uS/cm.</u>
Equipment Used	<u>Oakton</u>		

COMMENTS New lock

IDNR Form 542-1322

*Omit if only measuring groundwater elevations.

FORM FOR GROUNDWATER SAMPLING AND/OR GROUNDWATER ELEVATION MEASUREMENT

Site Name	<u>Anderson Carter Lake C&D Landfill</u>	Permit No.	<u>78-SDP-2-80C</u>
MW/Piezometer No.	<u>MW-5</u>	Upgradient	<u>X</u>
		Downgradient	<u></u>

Name of Person Sampling Jerry Barton

A. MONITORING WELL/PIEZOMETER CONDITIONS

Well/Piezometer Capped?	<u>Yes</u>	Standing Water/Litter?	<u>Yes</u>
If NO, Explain	<u></u>	If YES, Explain	<u>litter</u>

B. GROUNDWATER ELEVATION MEASUREMENT (+/- 0.01 foot, MSL)

Top of Casing Elevation	<u>985.15</u>	feet	Ground Elevation (ft.)	<u>982.85</u>
Drilled Well Depth (ft.)	<u>23.8</u>	feet	Casing Dia. (in.)	<u>2.0</u>
Measured Well Depth (ft.)	<u>23.8</u>	feet		

Equipment Used Heron

Groundwater Level (+/- 0.01 foot below top of inner casing, MSL):

	Date	Time	Depth to Groundwater (ft)	Groundwater Elevation
Before Purging	<u>10/17/2007</u>	<u>11:40 AM</u>	<u>16.80</u>	<u>968.35</u>
After Purging	<u></u>	<u></u>	<u>Dry</u>	<u>Dry</u>
Before Sampling	<u></u>	<u></u>	<u>20.92</u>	<u>964.23</u>

C. WELL PURGING*

Quantity of Water Removed from Well (gallons)	<u>5</u>
No. of Well Volumes (based on current water level)	<u>4.4</u>
Was well pumped/bailed dry?	<u>Yes</u>

Equipment Used:

Bailer Type	<u>Not Used</u>	Dedicated Bailer?	<u>No</u>
Pump Type	<u>Waterra</u>	Dedicated Pump?	<u>Yes</u>

If not dedicated, method of cleaning

D. FIELD MEASUREMENTS*

Weather Conditions 59 degrees Fahrenheit, raining

Field Measurements (after stabilization):

Temperature	<u>16.9</u>	Units	<u>Celsius</u>
Equipment Used	<u>Oakton</u>		
pH	<u>6.87</u>	Units	<u>Standard Units</u>
Equipment Used	<u>Oakton</u>		
Spec.Conductance	<u>2,670</u>	Units	<u>uS/cm.</u>
Equipment Used	<u>Oakton</u>		

COMMENTS Litter

IDNR Form 542-1322

*Omit if only measuring groundwater elevations.

FORM FOR GROUNDWATER SAMPLING AND/OR GROUNDWATER ELEVATION MEASUREMENT

Site Name	<u>Anderson Carter Lake C&D Landfill</u>	Permit No.	<u>78-SDP-2-80C</u>
MW/Piezometer No.	<u>MW-6</u>	Upgradient	<u>X</u>
		Downgradient	
Name of Person Sampling	<u>Jerry Barton</u>		

A. MONITORING WELL/PIEZOMETER CONDITIONS

Well/Piezometer Capped?	<u>Yes</u>	Standing Water/Litter?	<u>Yes</u>
If NO, Explain	<u> </u>		

B. GROUNDWATER ELEVATION MEASUREMENT (+/- 0.01 foot, MSL)

Top of Casing Elevation	<u>984.99</u>	feet	Ground Elevation (ft.)	<u>983.08</u>
Drilled Well Depth (ft.)	<u>56.9</u>	feet	Casing Dia. (in.)	<u>2.0</u>
Measured Well Depth (ft.)	<u>56.5</u>	feet		

Equipment Used	<u>Heron</u>		
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Groundwater Level (+/- 0.01 foot below top of inner casing, MSL):

	Date	Time	Depth to Groundwater (ft)	Groundwater Elevation
Before Purging	<u>10/17/2007</u>	<u>12:00 PM</u>	<u>16.98</u>	<u>968.01</u>
After Purging	<u> </u>	<u> </u>	<u>19.57</u>	<u>965.42</u>
Before Sampling	<u> </u>	<u> </u>	<u>19.49</u>	<u>965.50</u>

C. WELL PURGING*

Quantity of Water Removed from Well (gallons)	<u>20</u>
No. of Well Volumes (based on current water level)	<u>3.1</u>
Was well pumped/bailed dry?	<u>No</u>

Equipment Used:			
Bailer Type	<u>Not Used</u>	Dedicated Bailer?	<u>No</u>
Pump Type	<u>Waterra</u>	Dedicated Pump?	<u>Yes</u>

If not dedicated, method of cleaning	<u> </u>		
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D. FIELD MEASUREMENTS*

Weather Conditions	<u>59 degrees Fahrenheit, raining</u>		
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Field Measurements (after stabilization):

Temperature	<u>15.4</u>	Units	<u>Celsius</u>
Equipment Used	<u>Oakton</u>		
pH	<u>7.13</u>	Units	<u>Standard Units</u>
Equipment Used	<u>Oakton</u>		
Spec.Conductance	<u>2,670</u>	Units	<u>uS/cm.</u>
Equipment Used	<u>Oakton</u>		

COMMENTS	<u>Litter</u>		
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IDNR Form 542-1322

*Omit if only measuring groundwater elevations.

FORM FOR GROUNDWATER SAMPLING AND/OR GROUNDWATER ELEVATION MEASUREMENT

Site Name	<u>Anderson Carter Lake C&D Landfill</u>	Permit No.	<u>78-SDP-2-80C</u>
MW/Piezometer No.	<u>MW-7R</u>	Upgradient	<u>X</u>
		Downgradient	

Name of Person Sampling Jerry Barton

A. MONITORING WELL/PIEZOMETER CONDITIONS

Well/Piezometer Capped?	<u>Yes</u>	Standing Water/Litter?	<u>No</u>
If NO, Explain	<u> </u>		

B. GROUNDWATER ELEVATION MEASUREMENT (+/- 0.01 foot, MSL)

Top of Casing Elevation	<u>986.13</u>	feet	Ground Elevation (ft.)	<u>983.22</u>
Drilled Well Depth (ft.)	<u>23.1</u>	feet	Casing Dia. (in.)	<u>2.0</u>
Measured Well Depth (ft.)	<u>23.2</u>	feet		

Equipment Used Heron

Groundwater Level (+/- 0.01 foot below top of inner casing, MSL):

	Date	Time	Depth to Groundwater (ft)	Groundwater Elevation
Before Purging	<u>10/17/2007</u>	<u>9:00 AM</u>	<u>14.41</u>	<u>971.72</u>
After Purging	<u> </u>	<u> </u>	<u>Dry</u>	<u>Dry</u>
Before Sampling	<u> </u>	<u> </u>	<u>21.77</u>	<u>964.36</u>

C. WELL PURGING*

Quantity of Water Removed from Well (gallons)	<u>4</u>
No. of Well Volumes (based on current water level)	<u>2.8</u>
Was well pumped/bailed dry?	<u>Yes</u>

Equipment Used:

Bailer Type	<u>Dedicated Bailer</u>	Dedicated Bailer?	<u>Yes</u>
Pump Type	<u>Not Used</u>	Dedicated Pump?	<u>No</u>

If not dedicated, method of cleaning

D. FIELD MEASUREMENTS*

Weather Conditions 59 degrees Fahrenheit, raining

Field Measurements (after stabilization):

Temperature	<u>15.7</u>	Units	<u>Celsius</u>
Equipment Used	<u>Oakton</u>		
pH	<u>6.87</u>	Units	<u>Standard Units</u>
Equipment Used	<u>Oakton</u>		
Spec.Conductance	<u>2,620</u>	Units	<u>uS/cm.</u>
Equipment Used	<u>Oakton</u>		

COMMENTS New lock

IDNR Form 542-1322

*Omit if only measuring groundwater elevations.

FORM FOR GROUNDWATER SAMPLING AND/OR GROUNDWATER ELEVATION MEASUREMENT

Site Name	<u>Anderson Carter Lake C&D Landfill</u>	Permit No.	<u>78-SDP-2-80C</u>
MW/Piezometer No.	<u>MW-8</u>	Upgradient	<u>X</u>
		Downgradient	
Name of Person Sampling	<u>Jerry Barton</u>		

A. MONITORING WELL/PIEZOMETER CONDITIONS

Well/Piezometer Capped? If NO, Explain	<u>Yes</u>	Standing Water/Litter? If YES, Explain	<u>No</u>
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B. GROUNDWATER ELEVATION MEASUREMENT (+/- 0.01 foot, MSL)

Top of Casing Elevation	<u>982.05</u>	feet	Ground Elevation (ft.)	<u>979.05</u>
Drilled Well Depth (ft.)	<u>56.9</u>	feet	Casing Dia. (in.)	<u>2.0</u>
Measured Well Depth (ft.)	<u>56.5</u>	feet		

Equipment Used	<u>Heron</u>		
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Groundwater Level (+/- 0.01 foot below top of inner casing, MSL):

	Date	Time	Depth to Groundwater (ft)	Groundwater Elevation
Before Purging	<u>10/17/2007</u>	<u>9:30 AM</u>	<u>16.27</u>	<u>965.78</u>
After Purging	[REDACTED]	[REDACTED]	<u>16.38</u>	<u>965.67</u>
Before Sampling	[REDACTED]	[REDACTED]	<u>16.38</u>	<u>965.67</u>

C. WELL PURGING*

Quantity of Water Removed from Well (gallons)	<u>20</u>
No. of Well Volumes (based on current water level)	<u>3.0</u>
Was well pumped/bailed dry?	<u>No</u>

Equipment Used:			
Bailer Type	<u>Not Used</u>	Dedicated Bailer?	<u>No</u>
Pump Type	<u>Waterra</u>	Dedicated Pump?	<u>Yes</u>

If not dedicated, method of cleaning	
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D. FIELD MEASUREMENTS*

Weather Conditions	<u>59 degrees Fahrenheit, raining</u>		
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Field Measurements (after stabilization):

Temperature	<u>14.1</u>	Units	<u>Celsius</u>
Equipment Used	<u>Oakton</u>		
pH	<u>7.14</u>	Units	<u>Standard Units</u>
Equipment Used	<u>Oakton</u>		
Spec.Conductance	<u>2,580</u>	Units	<u>uS/cm.</u>
Equipment Used	<u>Oakton</u>		

COMMENTS	<u>New lock</u>		
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IDNR Form 542-1322

*Omit if only measuring groundwater elevations.

FORM FOR SURFACE WATER SAMPLING

Site Name	<u>Anderson Carter Lake C&D Landfill</u>	Permit No.	<u>78-SDP-2-80C</u>
Surface Monitoring Point No.	<u>SW-1</u>	Date	<u>10/17/2007</u>

Name of Person Sampling Jerry Barton

A. TYPE OF MONITORING POINT

Stream	<u> </u>
Road Ditch	<u> </u>
Drainage Ditch	<u>X</u>

Open Tile	<u> </u>
Tile with Riser	<u> </u>
Other	<u> </u>

B. PURPOSE OF MONITORING POINT

Upstream	<u> </u>
Within Landfill	<u>X</u>

Downstream	<u> </u>
Other	<u> </u>

C. MONITORING POINT CONDITIONS

Surface water drainage ditch along south portion of the site.

Was monitoring point dry? Yes Too little water to sample?

Yes

Was water flowing? No If yes, estimate quantity

NA

If yes, estimate depth

NA

Was water discolored? NA

Does water have odor? NA

Was ground discolored? No

Litter present? No

Comments sampling point was dry

D. FIELD MEASUREMENTS*

Weather Conditions 59 degrees Fahrenheit, raining

Field Measurements (after stabilization):

Temperature	<u>NM</u>	Units	<u>Celsius</u>
Equipment Used	<u>Oakton</u>		
pH	<u>NM</u>	Units	<u>Standard units</u>
Equipment Used	<u>Oakton</u>		
Spec.Conductance	<u>NM</u>	Units	<u>uS/cm.</u>
Equipment Used	<u>Oakton</u>		

COMMENTS

APPENDIX B
SUMMARY OF GROUNDWATER CHEMISTRY

Summary of Groundwater Chemistry

Carter Lake Construction and Demolition Landfill (Closed) - 78-SDP-02-80C

Parameter	Date	MW-1	MW-2	MW-3	MW-4	MW-5	MW-6	MW-7	MW-8
		DN1	UP2	DN1	UP2	DN1	UP2	UP1	UP1
Chemical Oxygen Demand - mg/L	10/2/1996	70.0	19.0	45.0	29.0	48.0	130	120	NM
	1/27/1997	62.0	15.0	54.0	33.0	76.0	150	120	NM
	4/15/1997	94.0	8.70	60.0	40.0	55.0	110	100	NM
	7/23/1997	58.0	6.80	85.0	18.0	47.0	100	110	NM
	10/15/1997	64.0	57.0	45.0	15.0	31.0	110	120	NM
	4/6/1998	110	44.0	48.0	17.0	62.0	52.0	77.0	NM
	10/13/1998	91.0	50.0	150	27.0	92.0	66.0	100	NM
	4/15/1999	89.0	NM	66.0	21.0	42.0	51.0	NM	NM
	10/7/1999	80.0	NM	49.0	22.0	69.0	89.0	NM	NM
	10/12/2000	56.0	NM	30.0	19.0	76.0	50.0	NM	NM
	10/4/2001	41.0	NM	NM	39.0	109	67.0	NM	85.0
	10/3/2002	51.0	NM	28.0	31.0	86.0	144	NM	28.0
	10/15/2003	120	NM	36.0	24.0	96.0	180	NM	100
	10/4/2004	53.0	NM	31.0	8.10	150	140	NM	69.0
	10/10/2005	140	NM	36.0	24.0	140	120	NM	95.0
	10/11/2006	308	NM	29.6	24.3	82.0	101	NM	111
	10/17/2007	315	NM	46.5	26.1	80.9	103	NM	114
Chloride - mg/L	10/2/1996	160	31.0	160	69.0	64.0	180	94.0	NM
	1/27/1997	150	36.0	140	85.0	85.0	140	83.0	NM
	4/15/1997	120	34.0	150	70.0	62.0	150	64.0	NM
	7/23/1997	140	36.0	120	61.0	60.0	150	110	NM
	10/15/1997	130	88.0	880	57.0	54.0	120	86.0	NM
	4/6/1998	110	70.0	78.0	62.0	50.0	75.0	89.0	NM
	10/13/1998	110	84.0	100	70.0	92.0	96.0	160	NM
	4/15/1999	48.0	NM	64.0	70.0	16.0	81.0	NM	160
	10/7/1999	160	NM	130	70.0	99.0	140	NM	NM
	10/12/2000	244	NM	120	62.0	100	100	NM	NM
	10/4/2001	221	NM	NM	98.0	72.0	118	NM	57.0
	10/3/2002	215	NM	97.0	61.0	75.0	166	NM	50.0
	10/15/2003	243	NM	141	46.9	75.3	219	NM	56.3
	10/4/2004	97.2	NM	169	47.0	52.4	196	NM	48.9
	10/10/2005	143	NM	132	67.1	61.4	186	NM	51.4
	10/11/2006	84.7	NM	144	67.1	56.3	172	NM	66.2
	10/17/2007	46.4	NM	193	64.3	51.6	192	NM	10.1
Iron, Dissolved - mg/L	10/2/1996	21.0	14.0	18.0	30.0	46.0	36.0	5.50	NM
	1/27/1997	22.0	14.0	21.0	32.0	75.0	34.0	6.90	NM
	4/15/1997	34.0	26.0	24.0	36.0	52.0	32.0	8.20	NM
	7/23/1997	21.0	13.0	62.0	27.0	53.0	30.0	11.0	NM
	10/15/1997	27.0	40.0	36.0	29.0	42.0	36.0	17.0	NM
	4/6/1998	44.0	27.0	25.0	29.0	24.0	27.0	28.0	NM
	10/13/1998	19.0	18.0	29.0	28.0	50.0	25.0	22.0	NM
	4/15/1999	11.0	NM	8.00	28.0	<0.1000	22.0	NM	NM
	10/7/1999	30.0	NM	28.0	33.0	20.0	29.0	NM	NM
	10/12/2000	24.5	NM	2.69	27.6	20.5	20.9	NM	NM
	10/4/2001	21.4	NM	NM	25.1	33.8	23.4	NM	15.3
	10/3/2002	15.8	NM	1.02	25.7	20.7	34.3	NM	10.3
	10/15/2003	1.76	NM	<0.1000	21.6	3.12	0.1300	NM	11.3
	10/4/2004	17.0	NM	0.4100	24.0	38.0	31.0	NM	32.0
	10/10/2005	11.0	NM	1.10	28.0	15.0	32.0	NM	34.0
	10/11/2006	2.44	NM	0.4230	29.0	9.08	29.4	NM	38.4
	10/17/2007	3.48	NM	4.78	24.9	10.3	28.4	NM	34.5
Nitrogen, Ammonia - mg/L HAL - 30 mg/L	10/2/1996	0.5800	1.20	0.3500	2.70	1.20	3.00	2.00	NM
	1/27/1997	0.5400	1.00	<0.2000	2.30	0.6600	3.40	1.20	NM
	4/15/1997	1.70	1.30	0.5800	2.40	0.8300	3.60	1.90	NM
	7/23/1997	1.10	1.30	2.00	2.50	0.5400	3.20	2.00	NM
	10/15/1997	1.30	2.10	0.6700	2.40	0.6400	2.60	1.60	NM
	4/6/1998	3.00	3.90	0.9800	3.00	0.4000	3.40	2.00	NM
	10/13/1998	1.60	2.90	1.10	2.90	0.6300	3.30	3.20	NM
	4/15/1999	1.50	NM	0.2200	3.10	<0.2000	3.40	NM	NM
	10/7/1999	3.60	NM	0.7900	3.20	0.7300	3.00	NM	NM
	10/12/2000	<1.00	NM	<1.00	2.40	<1.00	3.00	NM	NM
	10/4/2001	2.40	NM	NM	2.50	<1.00	3.80	NM	5.30
	10/3/2002	1.90	NM	<1.00	<1.00	<1.00	3.80	NM	6.10
	10/15/2003	1.23	NM	<0.2000	2.05	0.5900	4.23	NM	1.98
	10/4/2004	3.19	NM	<0.2000	2.60	0.4900	6.51	NM	2.64
	10/10/2005	3.44	NM	<0.2000	2.57	<0.2000	5.62	NM	5.13
	10/11/2006	8.38	NM	<0.2000	2.61	<0.2000	5.02	NM	5.53
	10/17/2007	6.79	NM	0.3020	2.38	0.4690	5.16	NM	4.85

Summary of Groundwater Chemistry

Carter Lake Construction and Demolition Landfill (Closed) - 78-SDP-02-80C

Parameter	Date	MW-1	MW-2	MW-3	MW-4	MW-5	MW-6	MW-7	MW-7R	MW-8
		DN1	UP2	DN1	UP2	DN1	UP2	UP1	UP1	DN2
PH - S.U.	10/2/1996	7.10	7.37	7.03	7.24	7.75	7.80	8.10	NM	7.20
	1/27/1997	6.87	7.38	7.10	6.98	6.84	6.86	7.48	NM	6.73
	4/15/1997	7.46	7.49	7.75	7.17	7.34	7.20	7.32	NM	7.55
	7/23/1997	6.55	6.99	7.62	6.95	7.07	6.98	7.12	NM	7.38
	10/15/1997	7.07	7.15	6.94	6.83	7.27	7.05	6.99	NM	7.01
	4/6/1998	7.27	7.38	7.05	6.97	7.44	6.92	7.08	NM	7.13
	10/13/1998	7.11	7.20	7.04	6.80	7.33	6.89	7.12	NM	7.30
	4/15/1999	6.23	NM	6.84	6.56	6.71	6.23	NM	NM	6.12
	10/7/1999	5.51	NM	5.72	5.73	6.26	5.74	NM	NM	5.16
	10/12/2000	5.45	NM	5.79	5.37	5.82	5.67	NM	NM	5.53
	10/4/2001	5.67	NM	NM	7.02	5.65	6.73	NM	5.21	6.85
	10/3/2002	6.71	NM	6.89	6.93	6.68	6.94	NM	6.99	6.91
	10/15/2003	6.18	NM	6.78	6.39	6.48	6.69	NM	6.30	6.29
	10/4/2004	7.27	NM	7.27	7.25	6.74	7.20	NM	6.74	7.02
	10/10/2005	7.00	NM	7.09	7.13	6.64	7.10	NM	6.80	7.00
	10/11/2006	6.89	NM	6.58	7.07	6.66	7.48	NM	6.93	7.01
	10/17/2007	6.88	NM	6.85	7.14	6.87	7.13	NM	6.87	7.14
Specific Conductance - umhos/cm	1/27/1997	1,670	1,410	1,380	1,930	2,950	2,130	2,480	NM	2,180
	4/15/1997	3,600	2,220	3,340	3,230	3,170	2,350	3,100	NM	2,820
	7/23/1997	1,990	2,820	3,090	3,180	2,820	2,730	2,640	NM	2,900
	10/15/1997	2,760	3,440	3,220	2,320	2,020	2,200	3,110	NM	2,760
	4/6/1998	2,630	3,060	3,090	2,420	1,880	1,950	3,240	NM	2,520
	10/13/1998	1,710	3,500	3,380	2,480	1,960	2,020	3,240	NM	2,610
	4/15/1999	2,360	NM	2,940	2,500	1,540	1,940	NM	NM	3,030
	10/7/1999	1,350	NM	1,900	1,240	1,460	960	NM	NM	1,750
	10/12/2000	2,090	NM	2,680	2,190	2,480	1,520	NM	NM	2,030
	10/4/2001	1,520	NM	NM	1,290	1,480	1,080	NM	1,280	
	10/3/2002	1,625	NM	1,578	1,458	1,941	1,787	NM	1,760	1,547
	10/15/2003	1,259	NM	740	981	814	776	NM	785	1,166
	10/4/2004	1,163	NM	1,056	880	1,123	968	NM	1,102	1,350
	10/10/2005	1,313	NM	1,212	1,108	1,456	1,188	NM	1,210	1,577
	10/11/2006	2,537	NM	2,118	2,051	2,617	2,289	NM	2,418	2,394
	10/17/2007	2,760	NM	3,000	2,280	2,670	2,670	NM	2,620	2,580
Total Organic Halogens - mg/L	10/2/1996	0.0320	<0.0100	0.0460	0.0430	0.0620	0.0370	0.0390	NM	0.0270
	10/15/1997	0.0300	0.0230	0.0240	0.0110	0.0200	<0.0100	0.0210	NM	0.0310
	10/13/1998	0.0600	0.0140	0.0460	0.0140	0.0440	<0.0100	0.0750	NM	0.0300
	10/7/1999	0.0339	NM	0.0542	0.0123	0.0403	0.0226	NM	NM	0.0423
	10/12/2000	0.0400	NM	0.1000	0.0300	0.2200	0.0100	NM	NM	0.0200
	10/4/2001	0.1130	NM	NM	0.0450	0.0920	<0.0100	NM	<0.0100	0.0130
	10/3/2002	0.0260	NM	0.0970	0.0260	0.1110	<0.0100	NM	0.0660	0.0180
	10/15/2003	0.0240	NM	0.0220	<0.0100	0.0590	0.0350	NM	0.0140	0.0290
	10/4/2004	0.0770	NM	0.0320	0.0100	0.0940	0.0120	NM	0.0210	0.0390
	10/10/2005	0.0770	NM	0.0240	0.0150	0.0790	<0.0100	NM	0.0150	0.0220
	10/11/2006	0.7580	NM	0.0176	0.0375	0.2130	0.0187	NM	0.0197	0.0187
	10/17/2007	0.5630	NM	0.0298	0.0248	0.2060	0.0395	NM	0.0255	0.0239
Total Phenols - mg/L HAL - 2 mg/L	10/2/1996	0.0230	0.0220	0.0220	<0.0200	<0.0200	0.0210	<0.0200	NM	0.0230
	10/15/1997	0.5450	0.2020	<0.0200	<0.0200	0.5860	0.3700	0.0480	NM	0.0930
	10/13/1998	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	NM	<0.0200	
	10/7/1999	0.0200	NM	<0.0200	<0.0200	<0.0200	<0.0200	NM	NM	<0.0200
	10/12/2000	<0.1000	NM	<0.1000	<0.1000	<0.1000	<0.1000	NM	NM	<0.1000
	10/4/2001	<0.1000	NM	NM	<0.1000	<0.1000	<0.1000	NM	<0.1000	<0.1000
	10/3/2002	<0.1000	NM	<0.1000	<0.1000	<0.1000	<0.1000	NM	<0.1000	<0.1000
	10/15/2003	0.0220	NM	<0.0200	<0.0200	<0.0200	<0.0200	NM	<0.0200	0.1960
	10/4/2004	<0.0200	NM	<0.0200	<0.0200	<0.0200	<0.0200	NM	<0.0200	<0.0200
	10/10/2005	0.0210	NM	<0.0200	<0.0200	<0.0200	<0.0200	NM	<0.0200	<0.0200
	10/11/2006	<0.0200	NM	<0.0200	<0.0200	<0.0200	<0.0200	NM	<0.0200	<0.0200
	10/17/2007	0.0255	NM	<0.0180	<0.0180	0.1000	<0.0200	NM	<0.0200	<0.0200
Benzene - ug/L MCL - 5 ug/L NRL - 1 ug/L	10/2/1996	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	NM	<1.0
	1/27/1997	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	NM	<0.5
	4/15/1997	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	NM	<0.5
	7/23/1997	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	NM	<0.5
1,2-Dichloroethane - ug/L MCL - 5 ug/L NRL - 0.4 ug/L	10/2/1996	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	NM	<1.0
	1/27/1997	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	NM	<0.4
	4/15/1997	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	NM	<0.4
	7/23/1997	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.8	NM	<0.4
Trichloroethylene - ug/L MCL - 5 ug/L NRL - 3 ug/L	10/2/1996	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	NM	<1.0
	1/27/1997	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	NM	<1.0
	4/15/1997	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	NM	<1.0
	7/23/1997	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	NM	<1.0
1,1-Dichloroethene - ug/L	10/2/1996	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	NM	<1.0
	1/27/1997	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	NM	<2.0
	4/15/1997	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	NM	<2.0
	7/23/1997	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<4.0	NM	<2.0
1,1,1-Trichloroethane - ug/L MCL - 200 ug/L HAL - 200 ug/L	10/2/1996	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	NM	<1.0
	1/27/1997	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	NM	<1.0
	4/15/1997	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	NM	<1.0
	7/23/1997	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	NM	<1.0

Summary of Groundwater Chemistry

Carter Lake Construction and Demolition Landfill (Closed) - 78-SDP-02-80C

Parameter	Date	MW-1	MW-2	MW-3	MW-4	MW-5	MW-6	MW-7	MW-7R	MW-8
		DN1	UP2	DN1	UP2	DN1	UP2	UP1	UP1	DN2
1,4-Dichlorobenzene - ug/L	10/2/1996	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	NM	<1.0
MCL - 75 ug/L	1/27/1997	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	NM	<1.0
HAL - 75 ug/L	4/15/1997	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	NM	<1.0
	7/23/1997	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0	NM	<1.0
Carbon Tetrachloride - ug/L	10/2/1996	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	NM	<1.0
MCL - 5 ug/L	1/27/1997	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	NM	<0.3
NRL - 0.3 ug/L	4/15/1997	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	NM	<0.3
	7/23/1997	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.6	NM	<0.3
Arsenic, Dissolved - mg/L	10/2/1996	0.0215	<0.0010	0.0294	0.0384	0.0503	0.1194	0.0033	NM	0.0188
MCL - 0.01 mg/L	1/27/1997	0.0220	<0.0010	0.0223	0.0314	0.0887	0.0682	<0.0010	NM	0.0080
	4/15/1997	0.0195	0.0239	0.0270	0.0425	0.0596	0.0752	0.0042	NM	0.0133
	7/23/1997	0.0281	<0.0010	0.0387	0.0339	0.0413	0.0745	0.0011	NM	0.0168
	10/15/1997	0.0332	0.0120	0.0354	0.0269	0.0410	0.0682	0.0035	NM	0.0141
	4/6/1998	NM	NM	0.0025	NM	0.0080	0.0352	NM	NM	0.0080
	10/13/1998	NM	NM	0.0307	NM	0.0484	0.0607	NM	NM	0.0157
	4/15/1999	NM	NM	0.0118	NM	0.0010	0.0492	NM	NM	0.0148
	10/7/1999	NM	NM	0.0086	NM	0.0264	0.0673	NM	NM	0.0175
	10/12/2000	NM	NM	<0.0010	NM	0.0200	0.0670	NM	NM	0.0160
	10/4/2001	0.0130	NM	NM	0.0260	0.0380	0.0580	NM	0.0250	0.0160
	10/3/2002	0.0110	NM	0.0050	0.0250	0.0150	0.0600	NM	0.0220	0.0160
	10/15/2003	<0.0010	NM	0.0019	0.0229	0.0018	0.0159	NM	0.0114	0.0021
	10/4/2004	0.0124	NM	0.0027	0.0216	0.0234	0.0678	NM	0.0204	0.0170
	10/10/2005	0.0318	NM	0.0096	0.0400	0.0085	0.0609	NM	0.0275	0.0171
	10/11/2006	0.0084	NM	0.0028	0.0446	0.0219	0.0643	NM	0.0545	0.0181
	10/17/2007	0.0088	NM	<0.0034	0.0330	0.0088	0.0500	NM	0.0310	0.0098
Barium, Dissolved - mg/L	10/2/1996	0.0750	0.3280	0.0480	0.1700	0.0460	1.00	0.6810	NM	0.2300
MCL - 2 mg/L	1/27/1997	0.0740	0.3180	0.0460	0.2020	0.0520	1.10	0.6200	NM	0.2100
HAL - 2 mg/L	4/15/1997	0.1730	0.1340	0.0640	0.2180	0.0480	0.9534	0.3730	NM	0.2100
	7/23/1997	0.0910	0.3320	0.0730	0.1810	0.0440	0.8970	0.6780	NM	0.1700
Cadmium, Dissolved - mg/L	10/2/1996	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	NM	<0.0005
MCL - 0.005 mg/L	1/27/1997	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	NM	<0.0005
HAL - 0.005 mg/L	4/15/1997	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	NM	<0.0005
	7/23/1997	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	NM	<0.0005
Chromium, Dissolved - mg/L	10/2/1996	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	NM	<0.0020
MCL - 0.1 mg/L	1/27/1997	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	NM	<0.0020
	4/15/1997	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	NM	<0.0020
	7/23/1997	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	NM	<0.0020
Copper, Dissolved - mg/L	10/2/1996	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	NM	<0.0200
MCL - 1.3 mg/L	1/27/1997	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	NM	<0.0200
	4/15/1997	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	<0.0500	<0.0500	NM	<0.0200
	7/23/1997	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	NM	<0.0200
Lead, Dissolved - mg/L	10/2/1996	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	NM	<0.0050
MCL - 0.015 mg/L	1/27/1997	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	NM	0.0055
	4/15/1997	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	NM	<0.0050
	7/23/1997	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	<0.0040	NM	<0.0040
Magnesium, Dissolved - mg/L	10/2/1996	140	70.0	130	100	140	110	150	NM	130
	1/27/1997	130	67.0	120	120	200	110	140	NM	120
	4/15/1997	150	130	200	130	210	98.0	92.0	NM	140
	7/23/1997	120	64.0	210	94.0	190	92.0	140	NM	130
Mercury, Dissolved - mg/L	10/2/1996	<0.0002	<0.0002	<0.0002	0.0003	0.0003	0.0003	<0.0002	NM	<0.0002
MCL - 0.002 mg/L	1/27/1997	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	NM	<0.0002
HAL - 0.002 mg/L	4/15/1997	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	NM	<0.0002
	7/23/1997	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	NM	<0.0002
Zinc, Dissolved - mg/L	10/2/1996	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	NM	<0.0200
HAL - 2 mg/L	1/27/1997	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	NM	<0.0200
	4/15/1997	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	<0.0500	<0.0500	NM	<0.0200
	7/23/1997	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	<0.0200	NM	<0.0200

Notes:

NM - Indicates parameter was not measured

< - Indicates less than the Method Detection Limit (MDL)

ug/L - Indicates micrograms per liter, equivalent to parts per billion at low concentrations

mg/L - Indicates milligrams per liter, equivalent to parts per million at low concentrations

USEPA HAL - Indicates United States Environmental Protection Agency Health Advisory Level

USEPA NRL - Indicates United States Environmental Protection Agency Negligible Risk Level for Carcinogens

USEPA MCL - Indicates United States Environmental Protection Agency Maximum Contaminant Level

Sampling performed over multiple dates is recorded on the first date sampled. Refer to field forms for exact sample date.

APPENDIX C
FALL ANALYTICAL DATA

November 01, 2007

Client:

BARKER, LEMAR & ASSOCIATES
1801 Industrial Circle
West Des Moines, IA 50265

Work Order: CQJ1191
Project Name: AE&W Closed Carter Lake-C&D LF (October)
Project Number: ANDEX 07101

Attn: Joe Herrick

Date Received: 10/19/07

An executed copy of the chain of custody is also included as an addendum to this report.

If you have any questions relating to this analytical report, please contact your Laboratory Project Manager at 1-(800)750-2401

SAMPLE IDENTIFICATION	LAB NUMBER	COLLECTION DATE AND TIME
MW-1	CQJ1191-01	10/17/07 10:15
MW-3	CQJ1191-02	10/17/07 10:35
MW-4	CQJ1191-03	10/17/07 11:00
MW-5	CQJ1191-04	10/17/07 11:40
MW-6	CQJ1191-05	10/17/07 12:00
MW-7R	CQJ1191-06	10/17/07 09:00
MW-8	CQJ1191-07	10/17/07 09:30

Samples were received into laboratory on ice.

NELAC states that samples which require thermal preservation shall be considered acceptable if the arrival temperature is within 2 degrees C of the required temperature or the method specified range. For samples with a temperature requirement of 4 degrees C, an arrival temperature from 0 degrees C to 6 degrees C meets specifications. Samples that are delivered to the laboratory on the same day that they are collected may not meet these criteria. In these cases, the samples are considered acceptable if there is evidence that the chilling process has begun, such as arrival on ice.

Please refer to the Temperature and Sample Receipt form that is included with this report for additional information regarding the condition of samples at the time of receipt by the laboratory.

The reported results were obtained in compliance with the 2003 NELAC standards unless otherwise noted.

Iowa Certification Number: 007

Reproduction of this analytical report is permitted only in its entirety. This report shall not be reproduced except in full without the written approval of the laboratory.

TestAmerica Analytical Testing Corporation certifies that the analytical results contained herein apply only to the specific sample analyzed.

Approved By:



TestAmerica - Cedar Falls, IA

Linda Cmelik

Project Coordinator

BARKER, LEMAR & ASSOCIATES
 1801 Industrial Circle
 West Des Moines, IA 50265
 Joe Herrick

Work Order: CQJ1191
 Project: AE&W Closed Carter Lake-C&D LF (October)
 Project Number: ANDEX 07101

Received: 10/19/07
 Reported: 11/01/07 17:07

ANALYTICAL REPORT

Analyte	Sample Result	Data Qualifiers	Units	Quan. Limit	Dilution Factor	Date Analyzed	Analyst	Seq/Batch	Method
Sample ID: CQJ1191-01 (MW-1 - Ground Water)									
General Chemistry Parameters									
Ammonia as N	6.79		mg/L	0.200	1	10/26/07 14:45	jcf	7101348	EPA 350.1
Chemical Oxygen Demand	315		mg/L	25.0	5	10/31/07 14:45	mkr	7101575	SM 5220 D
Chloride	46.4		mg/L	25.0	5	10/29/07 15:24	kmc	7101455	SM 4500 CI E/00
Phenol	0.0255		mg/L	0.0200	0.992	10/30/07 09:34	mdk	7101387	EPA 420.2
Total Organic Halides	0.563	S7	mg/L Cl-	0.0100	1	10/31/07 14:19	sas	7101529	SW 9020
Dissolved Metals by SW 846 Series Methods									
Iron	3.48		mg/L	0.100	1	10/24/07 15:55	lbb	7101122	SW 6010B
Metals Dissolved									
Arsenic	0.0088	R2	mg/L	0.0034	1	10/29/07 08:59	tdc	7100982	EPA 206.2
Sample ID: CQJ1191-02 (MW-3 - Ground Water)									
General Chemistry Parameters									
Ammonia as N	0.302		mg/L	0.200	1	10/26/07 14:46	jcf	7101348	EPA 350.1
Chemical Oxygen Demand	46.5		mg/L	5.00	1	10/31/07 14:45	mkr	7101575	SM 5220 D
Chloride	193		mg/L	5.00	1	10/29/07 15:25	kmc	7101455	SM 4500 CI E/00
Phenol	<0.0180		mg/L	0.0180	0.9	10/26/07 08:58	mdk	7101295	EPA 420.2
Total Organic Halides	0.0298		mg/L Cl-	0.0100	1	10/31/07 14:19	sas	7101529	SW 9020
Dissolved Metals by SW 846 Series Methods									
Iron	4.78		mg/L	0.100	1	10/26/07 18:41	lbb	7101426	SW 6010B
Metals Dissolved									
Arsenic	<0.0034		mg/L	0.0034	1	10/29/07 08:59	tdc	7100982	EPA 206.2
Sample ID: CQJ1191-03 (MW-4 - Ground Water)									
General Chemistry Parameters									
Ammonia as N	2.38		mg/L	0.200	1	10/26/07 14:47	jcf	7101348	EPA 350.1
Chemical Oxygen Demand	26.1		mg/L	5.00	1	10/31/07 14:45	mkr	7101575	SM 5220 D
Chloride	64.3		mg/L	5.00	1	10/29/07 15:25	kmc	7101455	SM 4500 CI E/00
Phenol	<0.0180		mg/L	0.0180	0.9	10/26/07 08:59	mdk	7101295	EPA 420.2
Total Organic Halides	0.0248		mg/L Cl-	0.0100	1	10/31/07 14:19	sas	7101529	SW 9020
Dissolved Metals by SW 846 Series Methods									
Iron	24.9		mg/L	0.100	1	10/26/07 18:46	lbb	7101426	SW 6010B
Metals Dissolved									
Arsenic	0.033		mg/L	0.0034	1	10/29/07 08:59	tdc	7100982	EPA 206.2
Sample ID: CQJ1191-04 (MW-5 - Ground Water)									
General Chemistry Parameters									
Ammonia as N	0.469		mg/L	0.200	1	10/26/07 14:48	jcf	7101348	EPA 350.1
Chemical Oxygen Demand	80.9		mg/L	5.00	1	10/31/07 14:45	mkr	7101575	SM 5220 D
Chloride	51.6		mg/L	5.00	1	10/29/07 15:29	kmc	7101455	SM 4500 CI E/00
Phenol	0.100		mg/L	0.0200	0.96	10/26/07 09:00	mdk	7101295	EPA 420.2
Total Organic Halides	0.206	S7	mg/L Cl-	0.0100	1	10/31/07 14:19	jmh	7101529	SW 9020
Dissolved Metals by SW 846 Series Methods									
Iron	10.3		mg/L	0.100	1	10/26/07 13:34	lbb	7101305	SW 6010B

BARKER, LEMAR & ASSOCIATES
1801 Industrial Circle
West Des Moines, IA 50265
Joe Herrick

Work Order: CQJ1191
Project: AE&W Closed Carter Lake-C&D LF (October)
Project Number: ANDEX 07101

Received: 10/19/07
Reported: 11/01/07 17:07

ANALYTICAL REPORT

Analyte	Sample Result	Data Qualifiers	Units	Quan. Limit	Dilution Factor	Date Analyzed	Analyst	Seq/Batch	Method
Sample ID: CQJ1191-04 (MW-5 - Ground Water) - cont.									
Metals Dissolved									
Arsenic	0.0088		mg/L	0.0034	1	10/29/07 08:59	tdc	7100982	EPA 206.2
Sample ID: CQJ1191-05 (MW-6 - Ground Water)									
General Chemistry Parameters									
Ammonia as N	5.16		mg/L	0.200	1	10/26/07 14:48	jcf	7101348	EPA 350.1
Chemical Oxygen Demand	103		mg/L	5.00	1	10/31/07 14:45	mkr	7101575	SM 5220 D
Chloride	192		mg/L	5.00	1	10/29/07 15:29	kmc	7101455	SM 4500 Cl E/00
Phenol	<0.0200		mg/L	0.0200	0.92	10/26/07 09:04	mdk	7101295	EPA 420.2
Total Organic Halides	0.0395	S7	mg/L Cl-	0.0100	1	10/31/07 14:19	sas	7101529	SW 9020
Dissolved Metals by SW 846 Series Methods									
Iron	28.4		mg/L	0.100	1	10/24/07 16:00	lbb	7101122	SW 6010B
Metals Dissolved									
Arsenic	0.050		mg/L	0.0034	1	10/29/07 08:59	tdc	7100982	EPA 206.2
Sample ID: CQJ1191-06 (MW-7R - Ground Water)									
General Chemistry Parameters									
Ammonia as N	4.85	M1	mg/L	0.200	1	11/01/07 09:43	jcf	7101542	EPA 350.1
Chemical Oxygen Demand	114		mg/L	5.00	1	10/31/07 14:45	mkr	7101575	SM 5220 D
Chloride	10.1		mg/L	5.00	1	10/29/07 15:31	kmc	7101456	SM 4500 Cl E/00
Phenol	<0.0200		mg/L	0.0200	1	10/26/07 09:05	mdk	7101295	EPA 420.2
Total Organic Halides	0.0255		mg/L Cl-	0.0100	1	11/01/07 14:19	sas	7101529	SW 9020
Dissolved Metals by SW 846 Series Methods									
Iron	34.5		mg/L	0.100	1	10/24/07 16:05	lbb	7101122	SW 6010B
Metals Dissolved									
Arsenic	0.031		mg/L	0.0034	1	10/29/07 08:59	tdc	7100982	EPA 206.2
Sample ID: CQJ1191-07 (MW-8 - Ground Water)									
General Chemistry Parameters									
Ammonia as N	2.07		mg/L	0.200	1	11/01/07 09:44	jcf	7101542	EPA 350.1
Chemical Oxygen Demand	32.3		mg/L	5.00	1	10/31/07 14:45	mkr	7101575	SM 5220 D
Chloride	42.1		mg/L	5.00	1	10/29/07 15:33	kmc	7101456	SM 4500 Cl E/00
Phenol	<0.0200		mg/L	0.0200	0.96	10/26/07 09:06	mdk	7101295	EPA 420.2
Total Organic Halides	0.0239		mg/L Cl-	0.0100	1	11/01/07 14:38	sas	7110048	SW 9020
Dissolved Metals by SW 846 Series Methods									
Iron	32.3		mg/L	0.100	1	10/26/07 18:51	lbb	7101426	SW 6010B
Metals Dissolved									
Arsenic	0.0098		mg/L	0.0034	1	10/29/07 08:59	tdc	7100982	EPA 206.2

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Project: AE&W Closed Carter Lake-C&D LF (October)
Project Number: ANDEX 07101

Received: 10/19/07
Reported: 11/01/07 17:07

SAMPLE EXTRACTION DATA

Parameter	Batch	Lab Number	Wt/Vol Extracted	Extracted Vol	Date	Analyst	Extraction Method
Dissolved Metals by SW 846 Series Methods							
SW 6010B	7101122	CQJ1191-01	50	50	10/22/07 09:31	LLW	SW 3010A
SW 6010B	7101426	CQJ1191-02	50	50	10/26/07 00:00	LBB	SW 3010A
SW 6010B	7101426	CQJ1191-03	50	50	10/26/07 00:00	LBB	SW 3010A
SW 6010B	7101305	CQJ1191-04	50	50	10/25/07 10:46	PTH	SW 3010A
SW 6010B	7101122	CQJ1191-05	50	50	10/22/07 09:31	LLW	SW 3010A
SW 6010B	7101122	CQJ1191-06	50	50	10/22/07 09:31	LLW	SW 3010A
SW 6010B	7101426	CQJ1191-07	50	50	10/26/07 00:00	LBB	SW 3010A
SW 7060A		CQJ1191-01					
SW 7060A		CQJ1191-02					
SW 7060A		CQJ1191-03					
SW 7060A		CQJ1191-04					
SW 7060A		CQJ1191-05					
SW 7060A		CQJ1191-06					
SW 7060A		CQJ1191-07					
Metals Dissolved							
EPA 206.2	7100982	CQJ1191-01	50	50	10/29/07 07:14	TDC	NO PREP - GFAA
EPA 206.2	7100982	CQJ1191-02	50	50	10/29/07 07:14	TDC	NO PREP - GFAA
EPA 206.2	7100982	CQJ1191-03	50	50	10/29/07 07:14	TDC	NO PREP - GFAA
EPA 206.2	7100982	CQJ1191-04	50	50	10/29/07 07:14	TDC	NO PREP - GFAA
EPA 206.2	7100982	CQJ1191-05	50	50	10/29/07 07:14	TDC	NO PREP - GFAA
EPA 206.2	7100982	CQJ1191-06	50	50	10/29/07 07:14	TDC	NO PREP - GFAA
EPA 206.2	7100982	CQJ1191-07	50	50	10/29/07 07:14	TDC	NO PREP - GFAA

BARKER, LEMAR & ASSOCIATES
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West Des Moines, IA 50265
Joe Herrick

Work Order: CQJ1191
Project: AE&W Closed Carter Lake-C&D LF (October)
Project Number: ANDEX 07101

Received: 10/19/07
Reported: 11/01/07 17:07

LABORATORY BLANK QC DATA

Analyte	Seq/ Batch	Source Result	Spike Level	Units	MDL	MRL	Dup Result	% REC	Dup Result	% REC Limits	RPD	RPD Limit	Q
General Chemistry Parameters													
Phenol	7101295			mg/L	N/A	0.0200	<0.0200						
Ammonia as N	7101348			mg/L	N/A	0.200	<0.200						
Phenol	7101387			mg/L	N/A	0.0200	<0.0200						
Chloride	7101455			mg/L	N/A	5.00	<5.00						
Chloride	7101456			mg/L	N/A	5.00	<5.00						
Total Organic Halides	7101529			mg/L Cl-	N/A	0.0100	<0.0100						
Ammonia as N	7101542			mg/L	N/A	0.200	<0.200						
Chemical Oxygen Demand	7101575			mg/L	N/A	5.00	<5.00						
Total Organic Halides	7110048			mg/L Cl-	N/A	0.0100	<0.0100						
Dissolved Metals by SW 846 Series Methods													
Iron	7101122			mg/L	N/A	0.100	<0.100						
Iron	7101305			mg/L	N/A	0.100	<0.100						
Iron	7101426			mg/L	N/A	0.100	<0.100						

BARKER, LEMAR & ASSOCIATES
1801 Industrial Circle
West Des Moines, IA 50265
Joe Herrick

Work Order: CQJ1191
Project: AE&W Closed Carter Lake-C&D LF (October)
Project Number: ANDEX 07101

Received: 10/19/07
Reported: 11/01/07 17:07

LABORATORY DUPLICATE QC DATA

Analyte	Seq/ Batch	Source Result	Spike Level	Units	MDL	MRL	Result	% REC	Dup %REC	% REC Limits	RPD	RPD Limit	Q
Dissolved Metals by SW 846 Series Methods													
QC Source Sample: CQJ1190-01													
Iron	7101426	<0.100		mg/L	N/A	0.100	<0.100					15	
QC Source Sample: CQJ1273-01													
Iron	7101426	0.0812		mg/L	N/A	0.100	0.0762				6	15	
Metals Dissolved													
QC Source Sample: WQJ0896-10													
Arsenic	7100982	<0.0034		mg/L	N/A	0.0034	<0.0034					12	

BARKER, LEMAR & ASSOCIATES
1801 Industrial Circle
West Des Moines, IA 50265
Joe Herrick

Work Order: CQJ1191

Received: 10/19/07
Reported: 11/01/07 17:07Project: AE&W Closed Carter Lake-C&D LF (October)
Project Number: ANDEX 07101**LCS/LCS DUPLICATE QC DATA**

Analyte	Seq/ Batch	Source Result	Spike Level	Units	MDL	MRL	Result	Dup Result	% REC	Dup %REC	% REC Limits	RPD	RPD Limit	Q
General Chemistry Parameters														
Phenol	7101295		0.100	mg/L	N/A	0.0180	0.0959		96		90-110			
Ammonia as N	7101348		4.19	mg/L	N/A	N/A	4.35		104		90-110			
Phenol	7101387		0.160	mg/L	N/A	0.0200	0.158		99		90-110			
Chloride	7101455		99.1	mg/L	N/A	5.00	105		106		90-110			
Chloride	7101456		99.1	mg/L	N/A	5.00	106		107		90-110			
Total Organic Halides	7101529		0.100	mg/L Cl-	N/A	0.0100	0.0996		100		70-130			
Ammonia as N	7101542		4.19	mg/L	N/A	N/A	4.37		104		90-110			
Chemical Oxygen Demand	7101575		251	mg/L	N/A	10.0	244		97		90-110			
Total Organic Halides	7110048		0.100	mg/L Cl-	N/A	0.0100	0.105		105		70-130			
Dissolved Metals by SW 846 Series Methods														
Iron	7101122		2.00	mg/L	N/A	0.100	1.88		94		85-115			
Iron	7101305		2.00	mg/L	N/A	0.100	1.91		95		85-115			
Iron	7101426		10.0	ug/mL	N/A	N/A	9.72		97		85-115			

BARKER, LEMAR & ASSOCIATES
 1801 Industrial Circle
 West Des Moines, IA 50265
 Joe Herrick

Work Order: CQJ1191
 Project: AE&W Closed Carter Lake-C&D LF (October)
 Project Number: ANDEX 07101

Received: 10/19/07
 Reported: 11/01/07 17:07

MATRIX SPIKE/MATRIX SPIKE DUPLICATE QC DATA

Analyte	Seq/ Batch	Source Result	Spike Level	Units	MDL	MRL	Dup Result	% REC	Dup %REC	% REC Limits	RPD	RPD Limit	Q
General Chemistry Parameters													
QC Source Sample: CQJ1033-16													
Phenol	7101295	0.00196	0.100	mg/L	N/A	0.0200	0.100	0.0994	98	97	90-110	1	15
QC Source Sample: CQJ0709-02													
Ammonia as N	7101348	0.0352	2.50	mg/L	N/A	0.200	2.19	2.23	86	88	90-110	2	20
QC Source Sample: CQJ1268-01													
Phenol	7101387	0.00309	0.160	mg/L	N/A	0.0200	0.159	0.163	98	100	90-110	3	15
QC Source Sample: CQJ1180-05													
Chloride	7101455	939	250	mg/L	N/A	50.0	1160	1140	90	80	90-110	2	20
QC Source Sample: CQJ1191-06													
Chloride	7101456	10.1	25.0	mg/L	N/A	5.00	33.9	33.9	95	95	90-110	0	20
QC Source Sample: CQJ0836-10													
Total Organic Halides	7101529	0.00696	0.100	mg/L Cl-	N/A	0.0100	0.0932	0.102	86	96	75-125	9	20
QC Source Sample: CQJ1191-06													
Ammonia as N	7101542	4.85	2.50	mg/L	N/A	0.200	6.95	6.69	84	73	90-110	4	20
QC Source Sample: CQJ1191-01													
Chemical Oxygen Demand	7101575	315	250	mg/L	N/A	25.0	574	577	104	105	75-125	0	20
QC Source Sample: CQJ1191-07													
Total Organic Halides	7110048	0.0239	0.100	mg/L Cl-	N/A	0.0100	0.128	0.133	104	109	75-125	4	20
Dissolved Metals by SW 846 Series Methods													
QC Source Sample: CQJ1180-02													
Iron	7101122	6.07	2.00	mg/L	N/A	0.100	8.18	7.93	106	93	75-125	3	10
QC Source Sample: CQJ1312-01													
Iron	7101305	0.0399	2.00	mg/L	N/A	0.100	1.94	1.96	95	96	75-125	1	10
Metals Dissolved													
QC Source Sample: CQJ1191-05													
Arsenic	7100982	0.0497	0.0200 00	mg/L	N/A	0.0034	0.0790	0.0810	146	156	69-134	2	12
													M11

BARKER, LEMAR & ASSOCIATES
1801 Industrial Circle
West Des Moines, IA 50265
Joe Herrick

Work Order: CQJ1191
Project: AE&W Closed Carter Lake-C&D LF (October)
Project Number: ANDEX 07101

Received: 10/19/07
Reported: 11/01/07 17:07

OTHER

Analyte	Seq/ Batch	Source Result	Spike Level	Units	MDL	MRL	Result	Dup Result	% REC	Dup %REC	% REC Limits	RPD	RPD Limit	Q
Dissolved Metals by SW 846 Series Methods														
Iron	7101426	0.0188	1.92	ug/mL	N/A	N/A	1.53	79			75-125			
Iron	7101426	1.45	1.92	ug/mL	N/A	N/A	2.84	72			75-125			M1

BARKER, LEMAR & ASSOCIATES
1801 Industrial Circle
West Des Moines, IA 50265
Joe Herrick

Work Order: CQJ1191
Project: AE&W Closed Carter Lake-C&D LF (October)
Project Number: ANDEX 07101

Received: 10/19/07
Reported: 11/01/07 17:07

CERTIFICATION SUMMARY

TestAmerica - Cedar Falls, IA

Method	Matrix	Nelac	Iowa
EPA 350.1	Water - NonPotable	X	X
EPA 420.2	Water - NonPotable	X	X
SM 4500 Cl E/00	Watcr - NonPotable	X	X
SM 5220 D	Water - NonPotable		
SW 6010B	Water - NonPotable	X	X
SW 9020	Watcr - NonPotable	X	X

Subcontracted Laboratories

TestAmerica Analytical - Watertown NELAC Cert #100453

602 Commerce Drive P.O. Box 288 - Watertown, WI 53094-0288

Method Performed: EPA 206.2

Samples: CQJ1191-01, CQJ1191-02, CQJ1191-03, CQJ1191-04, CQJ1191-05, CQJ1191-06, CQJ1191-07

Any abnormalities or departures from sample acceptance policy shall be documented on the 'Sample Receipt and Temperature Log Form' and 'Sample Non-conformance Form' (if applicable) included with this report.

For information concerning certifications of this facility or another TestAmerica facility, please visit our website at www.TestAmericaInc.com

Samples collected by TestAmerica Field Services personnel are noted on the Chain of Custody (COC) and are sampled in accordance with TA-CF SOP CF09-01.

DATA QUALIFIERS AND DEFINITIONS

- M1 The MS and/or MSD were outside control limits.
M11 The MS and/or MSD were above the acceptance limits. See calibration verification (CCV)
R2 The RPD exceeded the acceptance limit.
S7 Sample breakthrough to 2nd section is > 10%. Results may be biased low.

ADDITIONAL COMMENTS

Test America

Interpretation

704 Enterprise Drive
Cedar Falls, Iowa 50613

ANDEX 05101

SAMPLER: Barker Lerner Engineering Consultants

SITE NAME: Anderson Excavating & Wrecking, Closed Carter Lake C&D Landfill (October)

ADDRESS: 1801 Industrial Circle

CITY/STATE/ZIP: West Des Moines, IA 50265

TELEPHONE NUMBER: 515-256-8814

Fax: 515-256-0152

SAMPLED BY: (PRINT NAME)

SIGNATURE

Phone: 319-277-2401

or 1-800-750-2401

Fax: 615-792-7989

John Herrick

© Parker Lemar Engineering Consultants

Anderson Excavating & Wrecking, Closed Carter Lake C&D Landfill (October)

INDEX 07101

801 Industrial Circle

West Des Moines IA 50265

LABORATORY WORK ORDER NO.

Matrix

Analyze For:

Sample ID	Date Sampled	Time Sampled	# of Containers Shipped	Preservative	Matrix	Analyze For:	Standard TAT	Fax Results	LABORATORY SAMPLE NUMBER												
	Grab	Composite	Field Filtered	HNO ₃ (Red & White Label)	HCl (Blue & White Label)	NaOH (Orange & White Label)	H ₂ SO ₄ Plastic (Yellow & White Label)	H ₂ SO ₄ Glass (Yellow & White Label)	None (Black & White Label)	Other (Specify):	Groundwater	Wastewater	Drinking Water	Sludge	Soil	Other (Specify):	T ₀ test	T ₆ test	Aerobic		
MW-1	10-17			X X													X	X	X		
MW-3																	X	X	X		
MW-4																	X	X	X		
MW-5																	X	X	X		
MW-6																	X	X	X		
MW-7R																	X	X	X		
MW-8																	X	X	X		
SW-1																	X	X	X		

TestAmerica

ANALYTICAL TESTING CORPORATION

704 ENTERPRISE DRIVE • CEDAR FALLS, IA 50613 • 800-750-2401 • 319-277-2425 FAX

Sample Receipt and Temperature Log Form

Client: Bailek or Henegar Project: Anderson Excavating & Wrecking, Closed Carter Lumber
City: West Des Moines, IA

Date: 10-18-07 Receiver's Initials: SCM Time (Delivered): 17:45

Temperature Record:

Cooler ID# (If Applicable)	
<u>Q1A1G1</u>	
2.3 °C / On Ice	

Thermometer:

Courier:

<input type="checkbox"/> UPS	<input checked="" type="checkbox"/> TA Courier
<input type="checkbox"/> FedEx	<input type="checkbox"/> TA Field Services
<input type="checkbox"/> DHL	<input type="checkbox"/> Client
<input type="checkbox"/> US Postal Service	<input type="checkbox"/> Other
<input type="checkbox"/> Spee-Dee	<input type="checkbox"/>

Custody seals present?

Yes

Custody seals intact?

Yes No

Temperature out of compliance

Exceptions Noted

<input type="checkbox"/> Sample(s) not received in a cooler.
<input type="checkbox"/> Samples(s) received same day of sampling.
<input type="checkbox"/> Evidence of a chilling process
<input type="checkbox"/> Temperature not taken: <u> </u>

*Refer to SOP CF01-01 for Temperature Criteria

H:\QA\Forms & Log Book pgs\Cooler Receipt rev11.doc

Sample Receipt and Temperature Log Form

Client: Barker Le Mar

Project: Anderson Excavating + Wrecking, Closed Carter Lake

City: West Des Moines, IA

Date: 10-18-07 Receiver's Initials: JLH Time (Delivered): 17:45

Temperature Record:

Cooler ID# (If Applicable)	<u>LL02</u>
<u>2.9 °C / On Ice</u>	

Temp Blank

Temperature out of compliance

Thermometer:

- IR - 61997670 'A'
- IR - 61997671 'B'
- IR - 61854108
- 22126775

Courier:

- | | |
|--|--|
| <input type="checkbox"/> UPS | <input checked="" type="checkbox"/> TA Courier |
| <input type="checkbox"/> FedEx | <input type="checkbox"/> TA Field Services |
| <input type="checkbox"/> DHL | <input type="checkbox"/> Client |
| <input type="checkbox"/> US Postal Service | <input type="checkbox"/> Other |
| <input type="checkbox"/> Spee-Dee | _____ |

Custody seals present?

Yes

Custody seals intact?

Yes No

Non-Conformance report started

Exceptions Noted

<input type="checkbox"/>	Sample(s) not received in a cooler.
<input type="checkbox"/>	Samples(s) received same day of sampling.
<input type="checkbox"/>	Evidence of a chilling process
<input type="checkbox"/>	Temperature not taken: _____

APPENDIX D
EXCEEDANCE TABLE

**Summary of Statistical Exceedances Groundwater
Monitoring Wells by Well Cluster
Carter Lake Construction and Demolition Landfill (Closed) - 78-SDP-02-80C**

MW-1 - Cluster DN1

Chemical Oxygen Demand

Mean:	101.5	STD:	15.4	Exceedances Level:	132.32
Current Action Levels:	None Established				
10/17/2007	315 mg/L				

Nitrogen, Ammonia

Mean:	3.245	STD:	1.670	Exceedances Level:	6.5848
Current Action Levels:	HAL - 30 mg/L				
10/17/2007	6.79 mg/L				

Total Organic Halogens

Mean:	0.0306	STD:	0.0214	Exceedances Level:	0.07336
Current Action Levels:	None Established				
10/17/2007	0.563 mg/L				

MW-3 - Cluster DN1

Chloride

Mean:	71.9	STD:	33.9	Exceedances Level:	139.63
Current Action Levels:	None Established				
10/17/2007	193 mg/L				

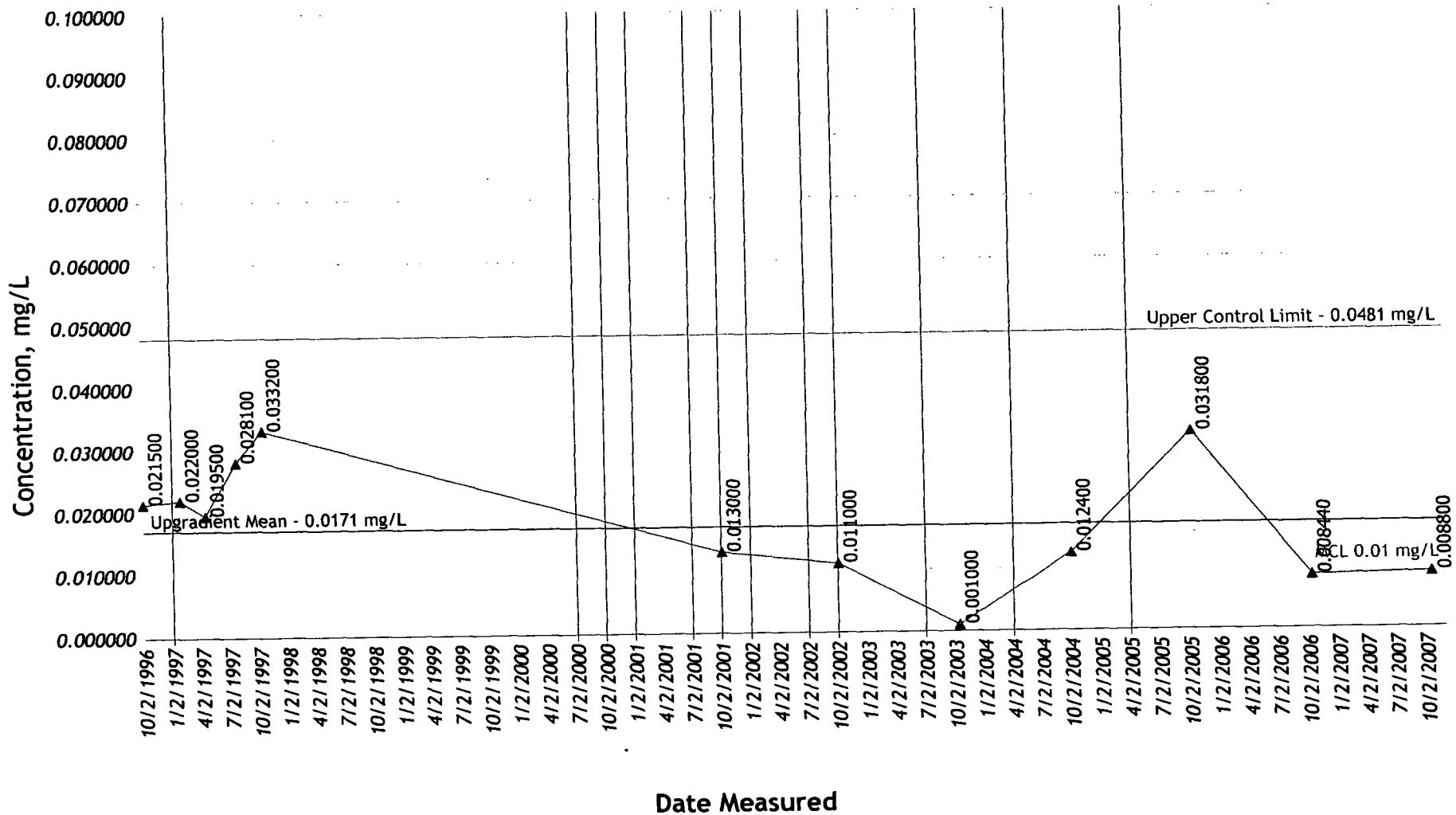
MW-5 - Cluster DN1

Total Organic Halogens

Mean:	0.0306	STD:	0.0214	Exceedances Level:	0.07336
Current Action Levels:	None Established				
10/17/2007	0.206 mg/L				

APPENDIX E
GRAPHS OF ANALYTICAL PARAMETERS/MONITORING POINT

Arsenic, Dissolved Trends - (MW-1)



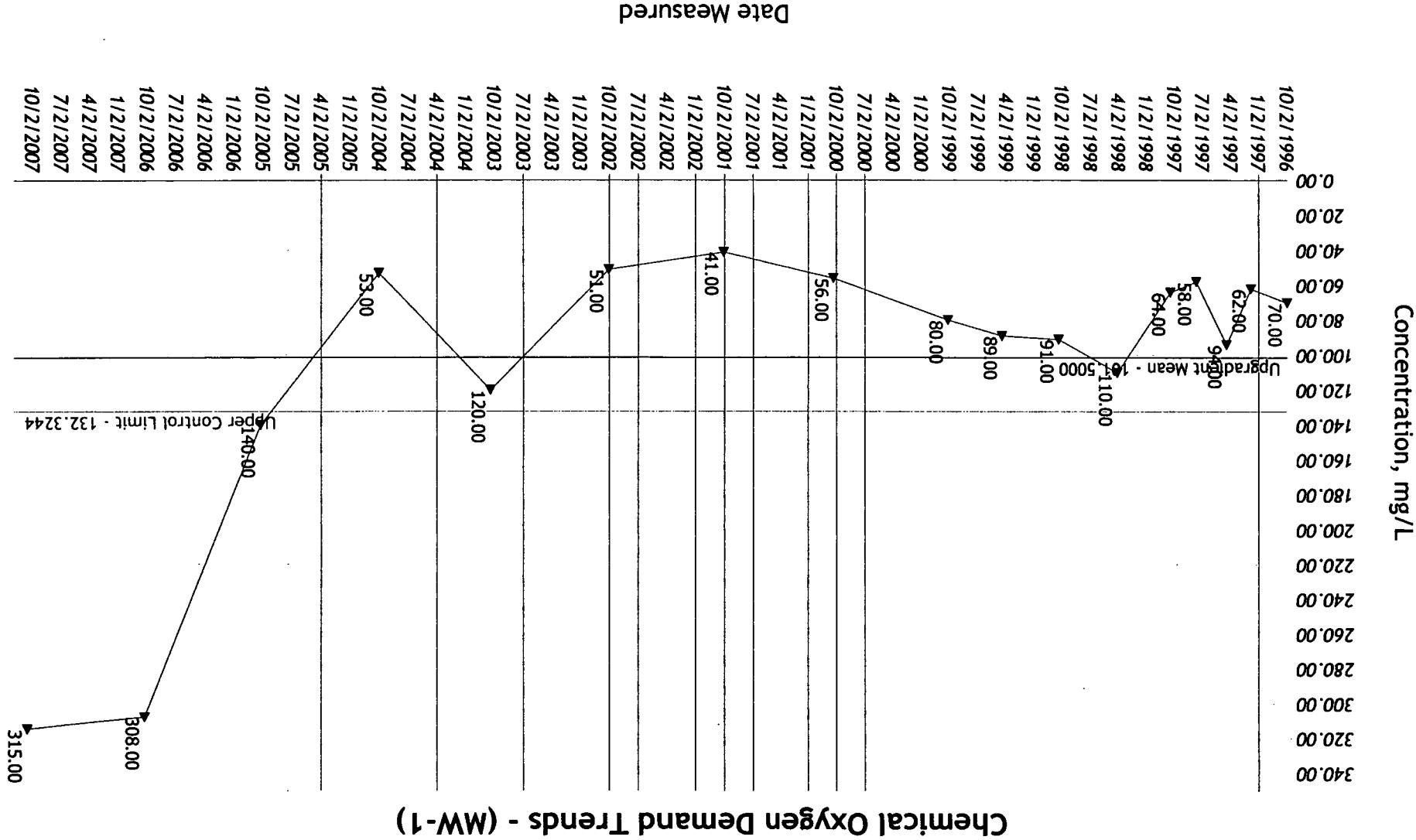
1

**Arsenic, Dissolved
Carter Lake Construction and Demolition Landfill (Closed)
78-SDP-02-80C**

07101
11/28/2007 11:57:18 AM

Carter Lake Construction and Demolition Landfill (Closed)

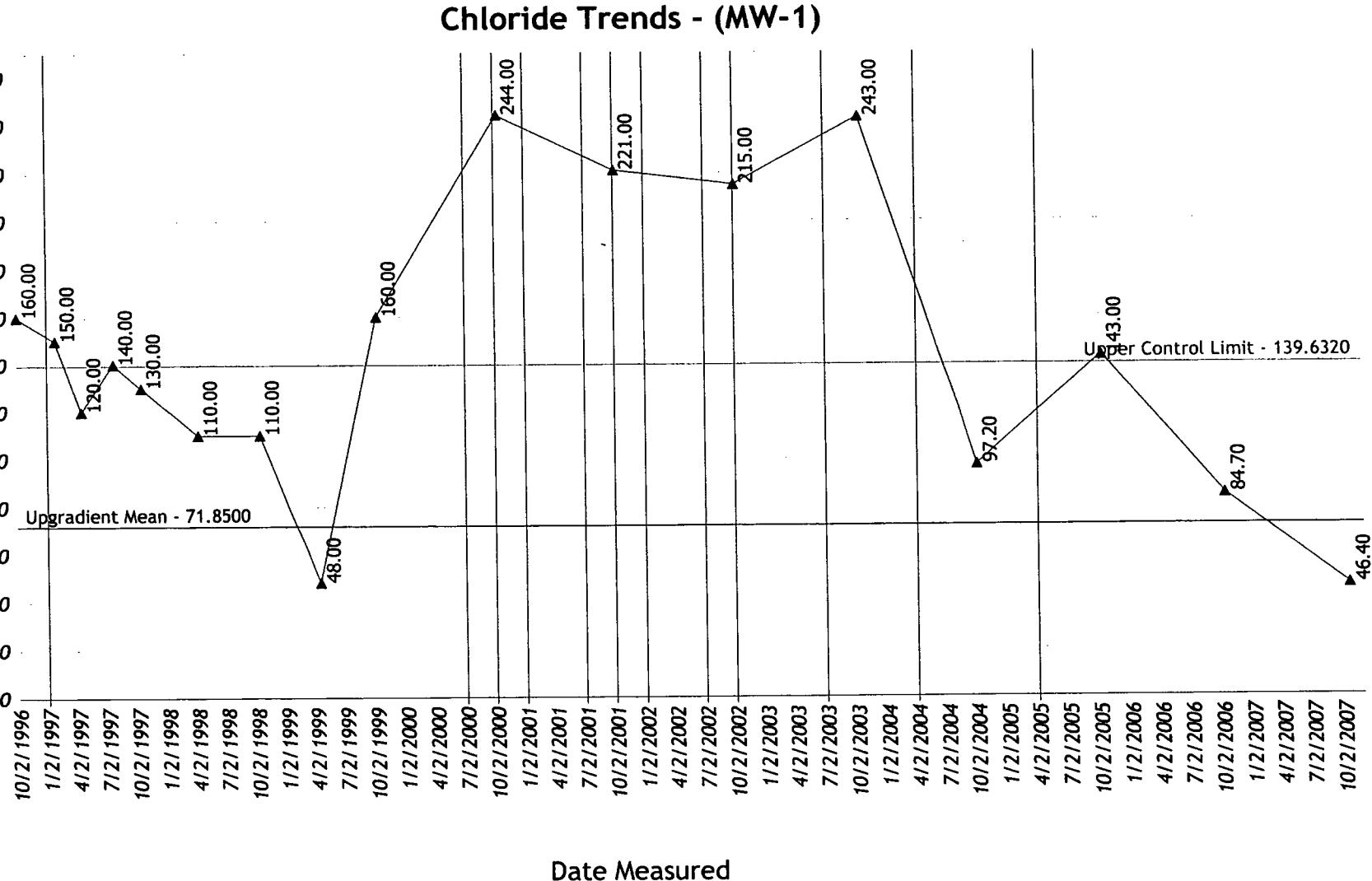
2



3

Chloride
Carter Lake Construction and Demolition Landfill (Closed)
78-SDP-02-80C

Concentration, mg/L

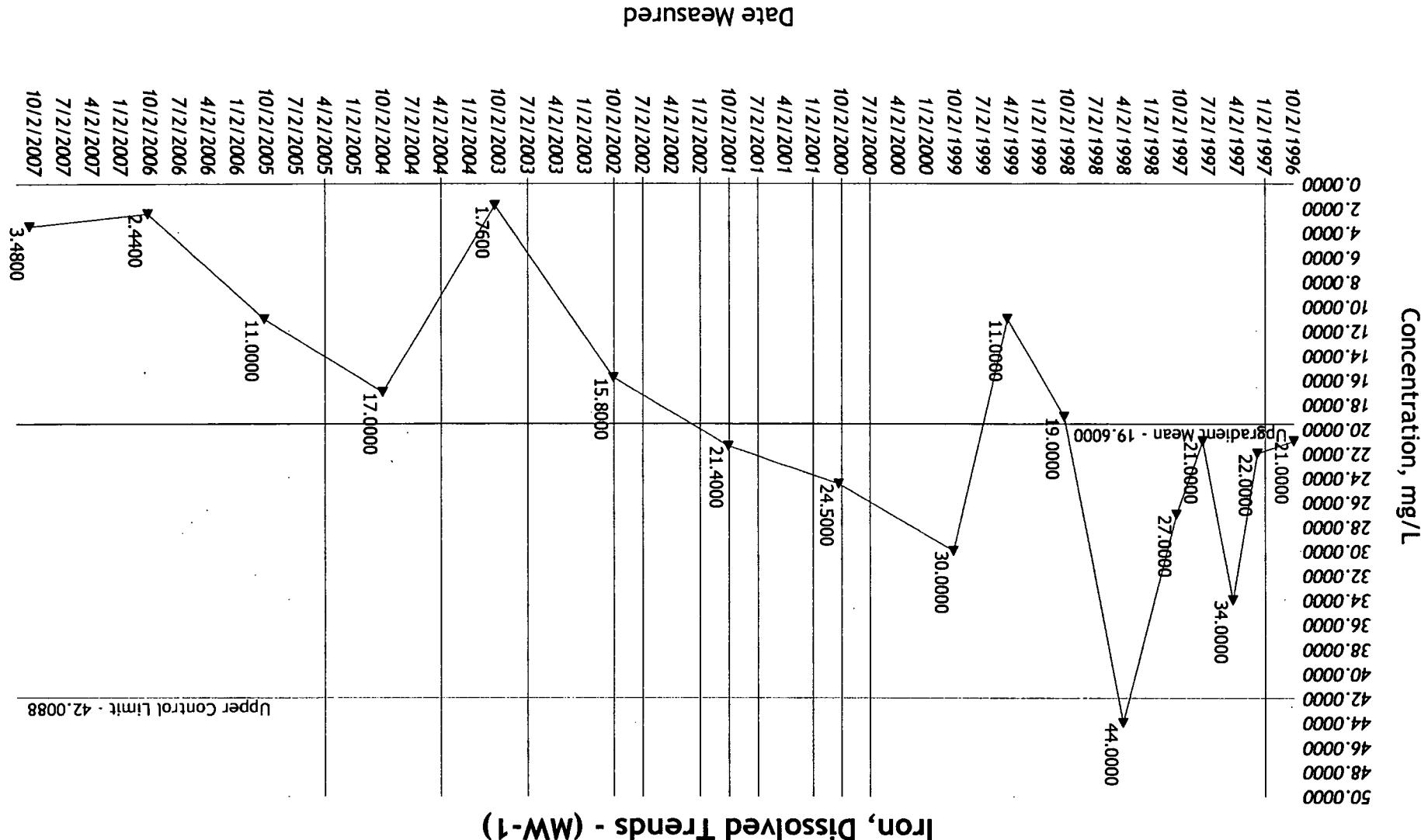


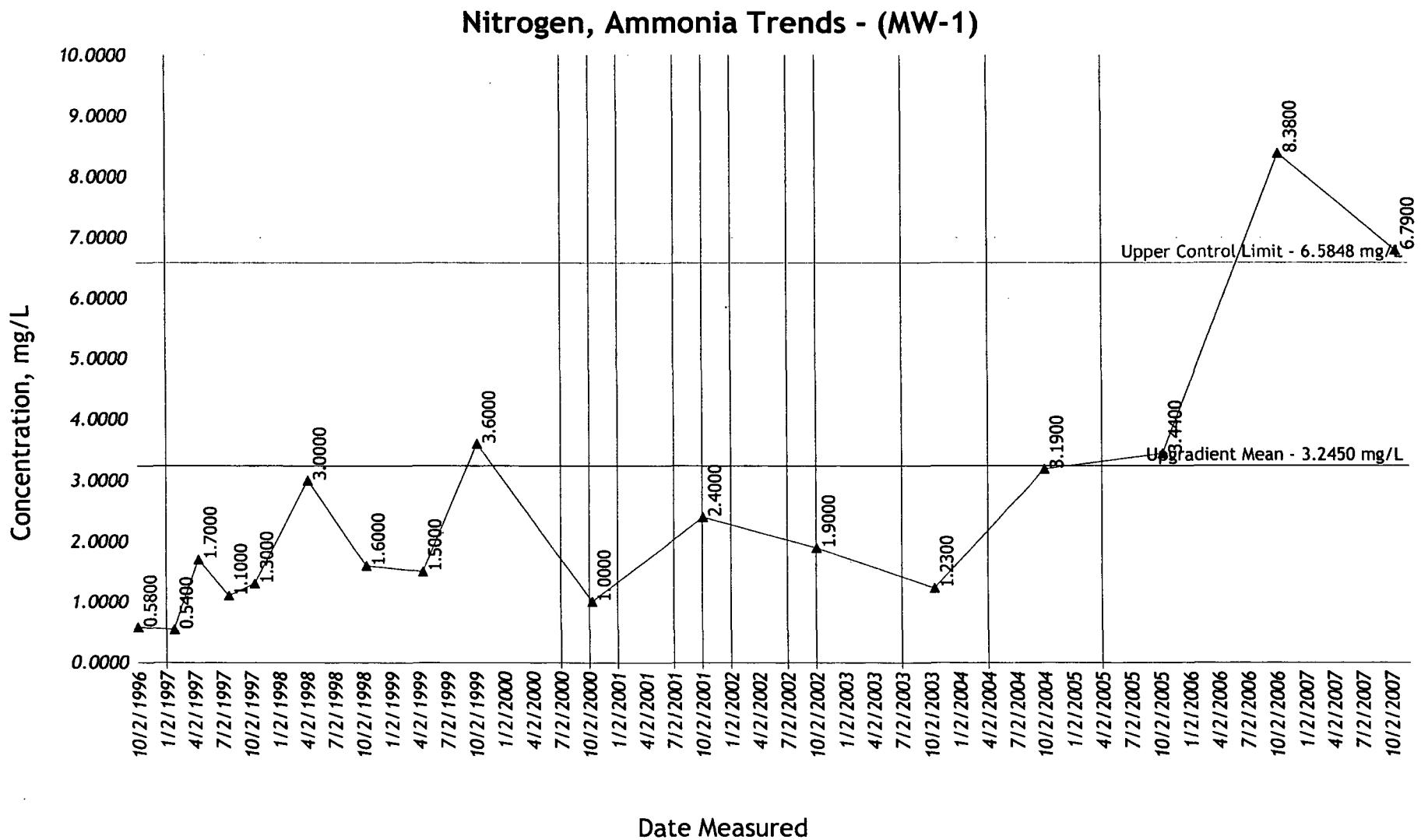
07101
11/28/2007 11:57:19 AM

Cartier Lake Construction and Demolition Landfill (Closed)

Iron, Dissolved

07101
11/28/2007 11:57:20 AM





5

Nitrogen, Ammonia
Carter Lake Construction and Demolition Landfill (Closed)
 78-SDP-02-80C

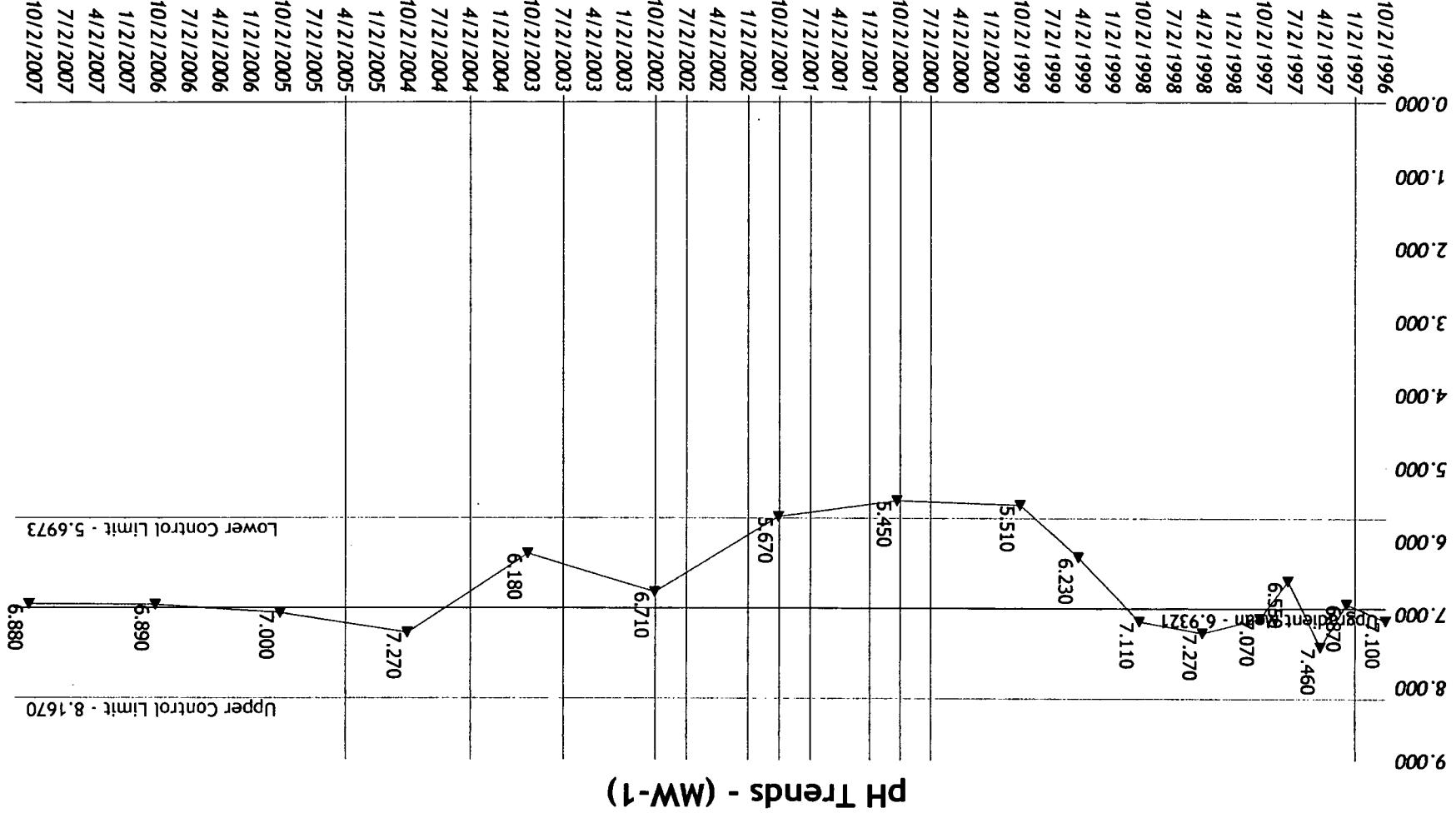
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Carter Lake Construction and Demolition Landfill (Closed)

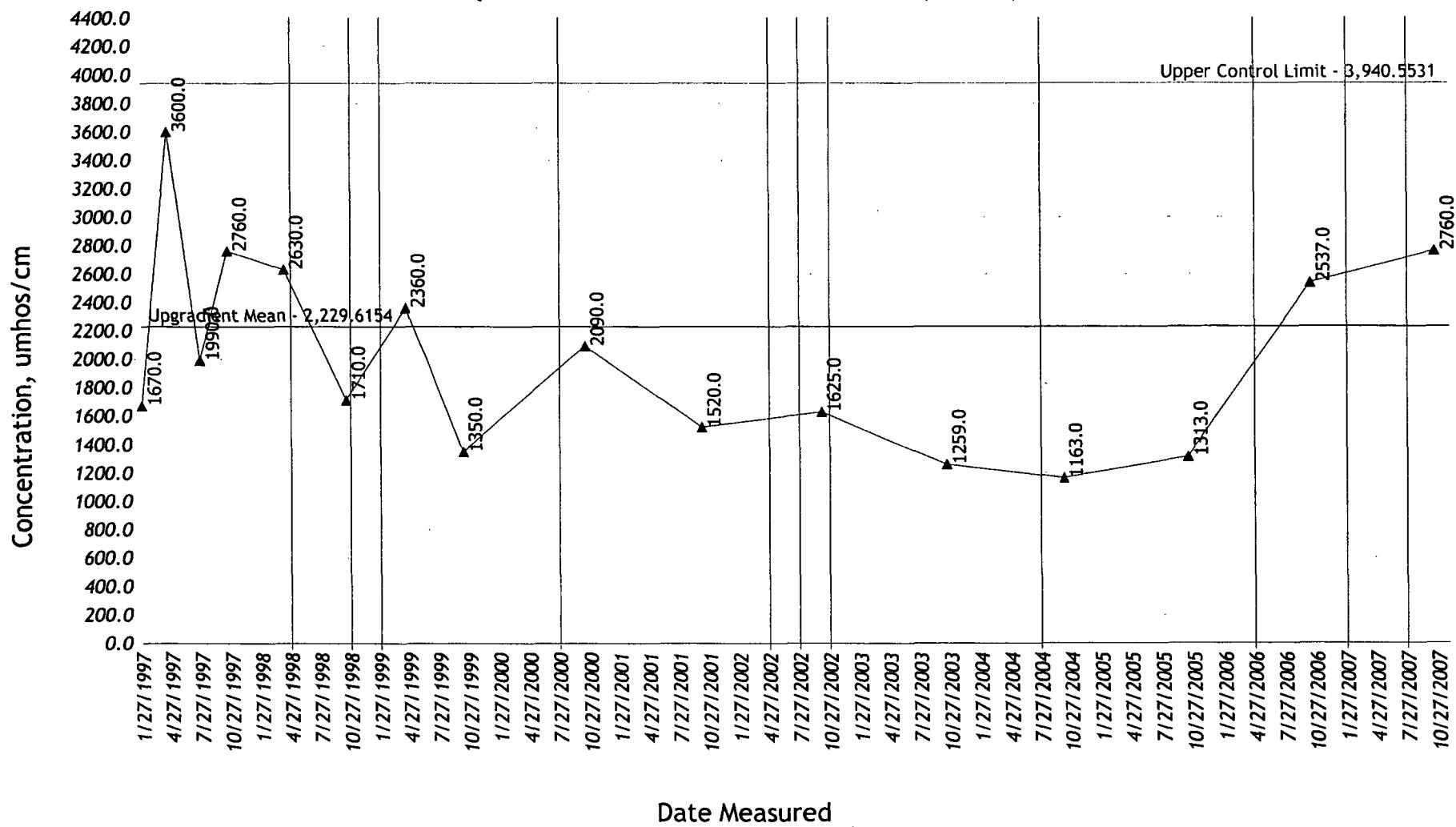
pH

11/28/2007 11:57:20 AM

07101



Specific Conductance Trends - (MW-1)



7

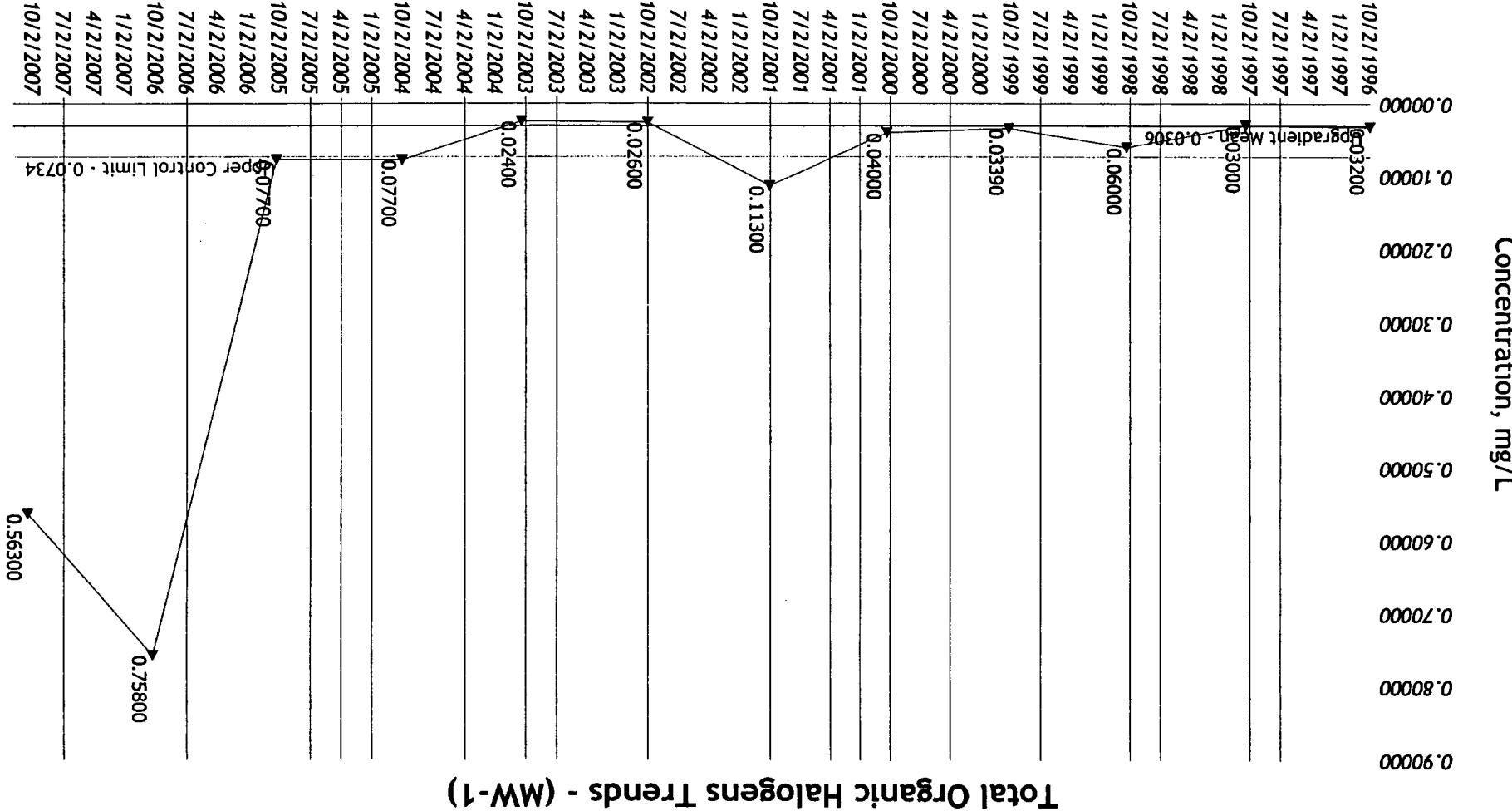
Specific Conductance
Carter Lake Construction and Demolition Landfill (Closed)
78-SDP-02-80C

07101
11/28/2007 11:57:20 AM

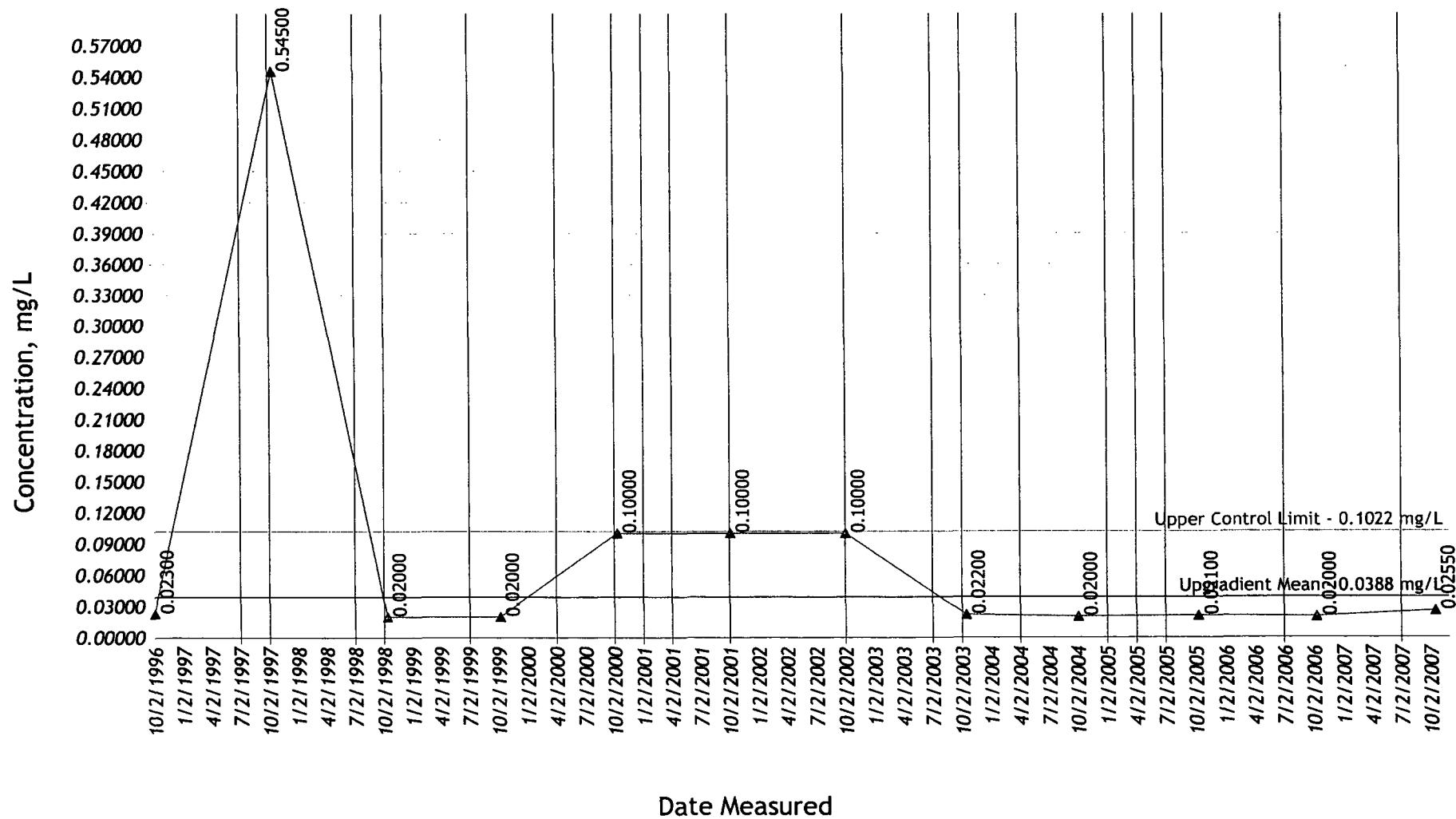
78-SDP-02-80C
Carter Lake Construction and Demolition Landfill (Closed)

Total Organic Halogens

07101
11/28/2007 11:57:21 AM



Total Phenols Trends - (MW-1)



9

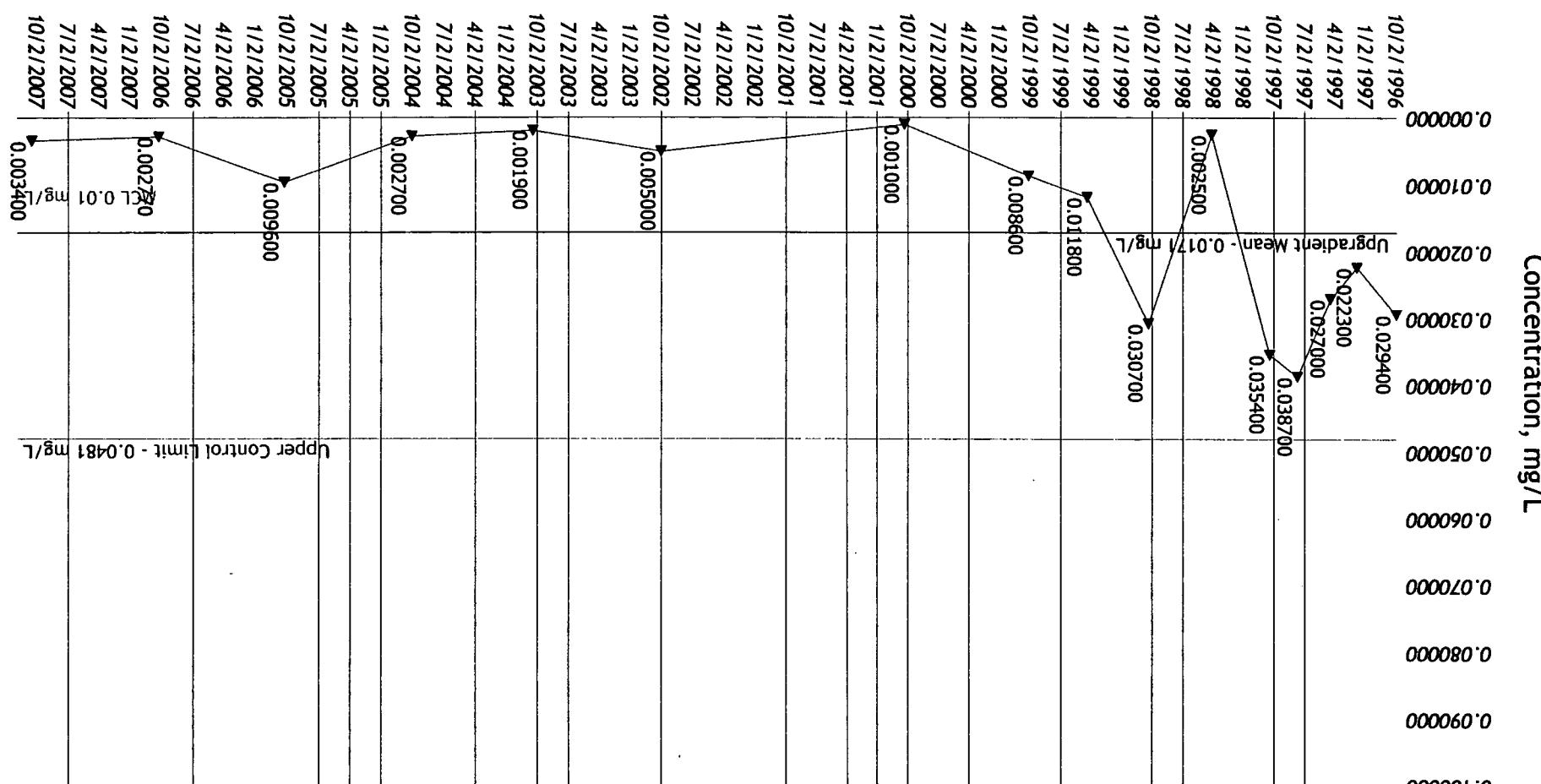
Total Phenols
Carter Lake Construction and Demolition Landfill (Closed)
 78-SDP-02-80C

07101
 11/28/2007 11:57:21 AM

Carter Lake Construction and Demolition Landfill (Closed)

Arsenic, Dissolved

10

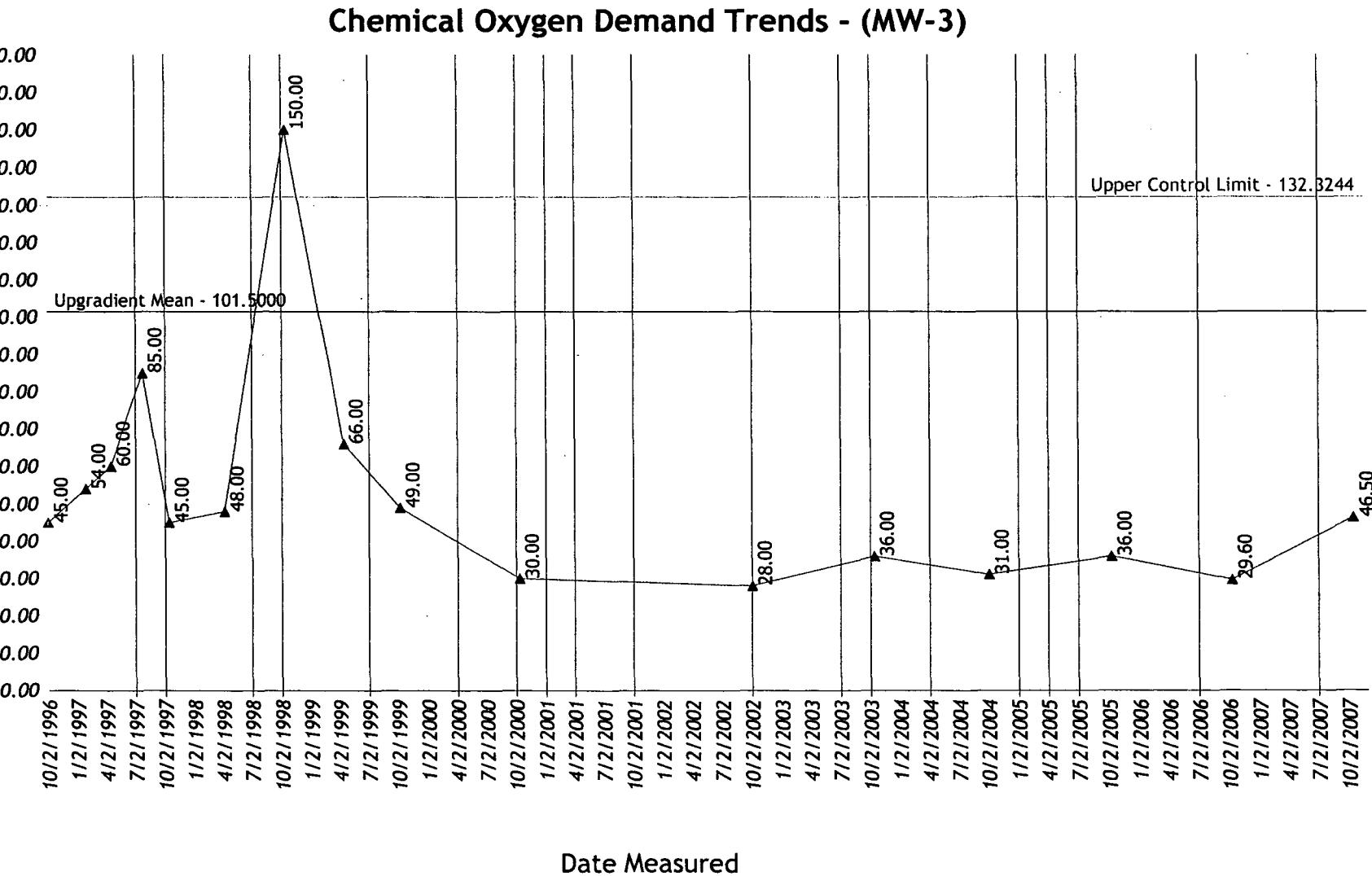


Arsenic, Dissolved Trends - (MW-3)

11

**Chemical Oxygen Demand
Carter Lake Construction and Demolition Landfill (Closed)
78-SDP-02-80C**

Concentration, mg/L



07101

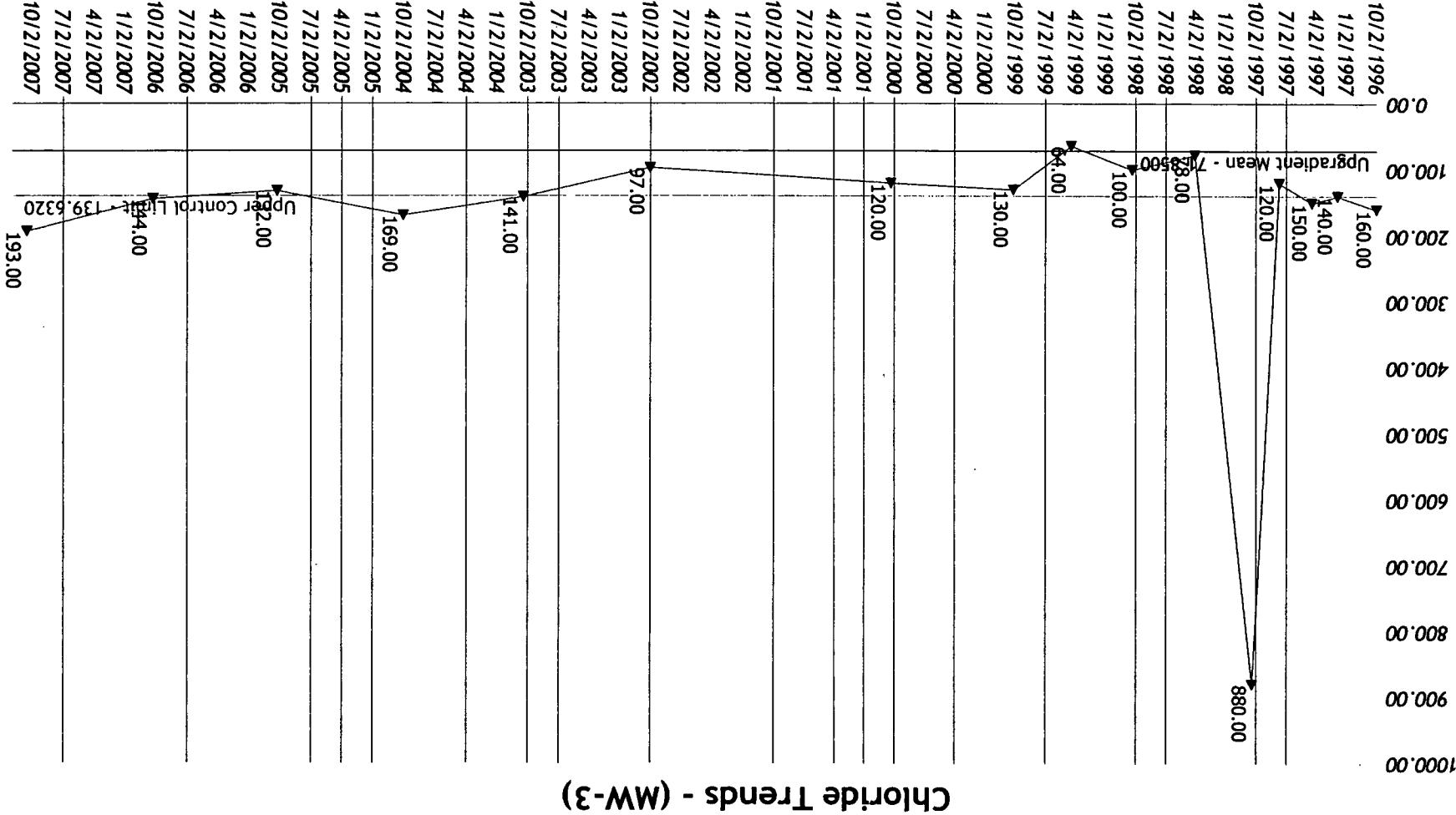
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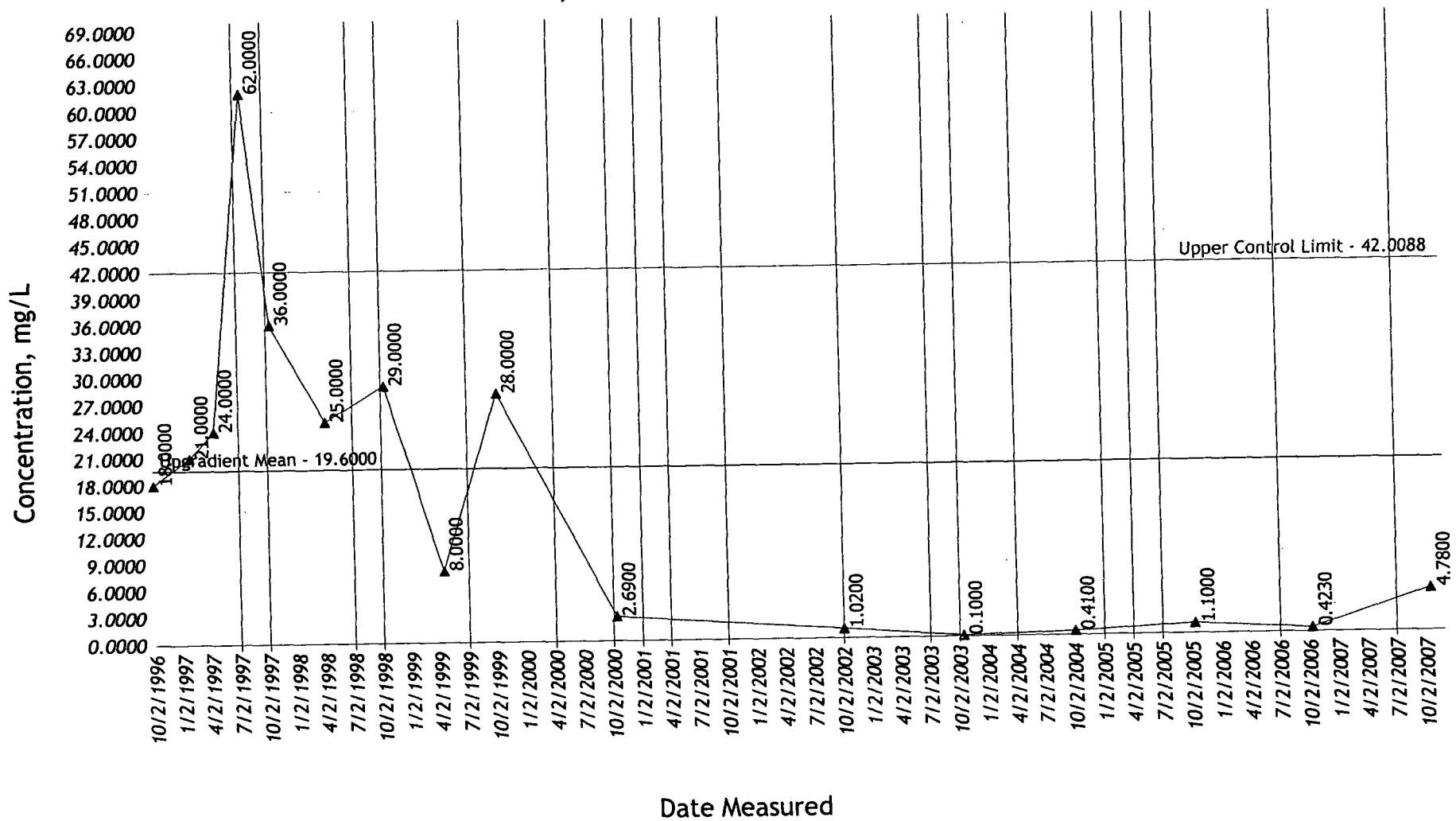
Carter Lake Construction and Demolition Landfill (Closed)
Chloride

07101
11/28/2007 11:57:22 AM

Concentration, mg/L



Iron, Dissolved Trends - (MW-3)



13

Iron, Dissolved
Carter Lake Construction and Demolition Landfill (Closed)
 78-SDP-02-80C

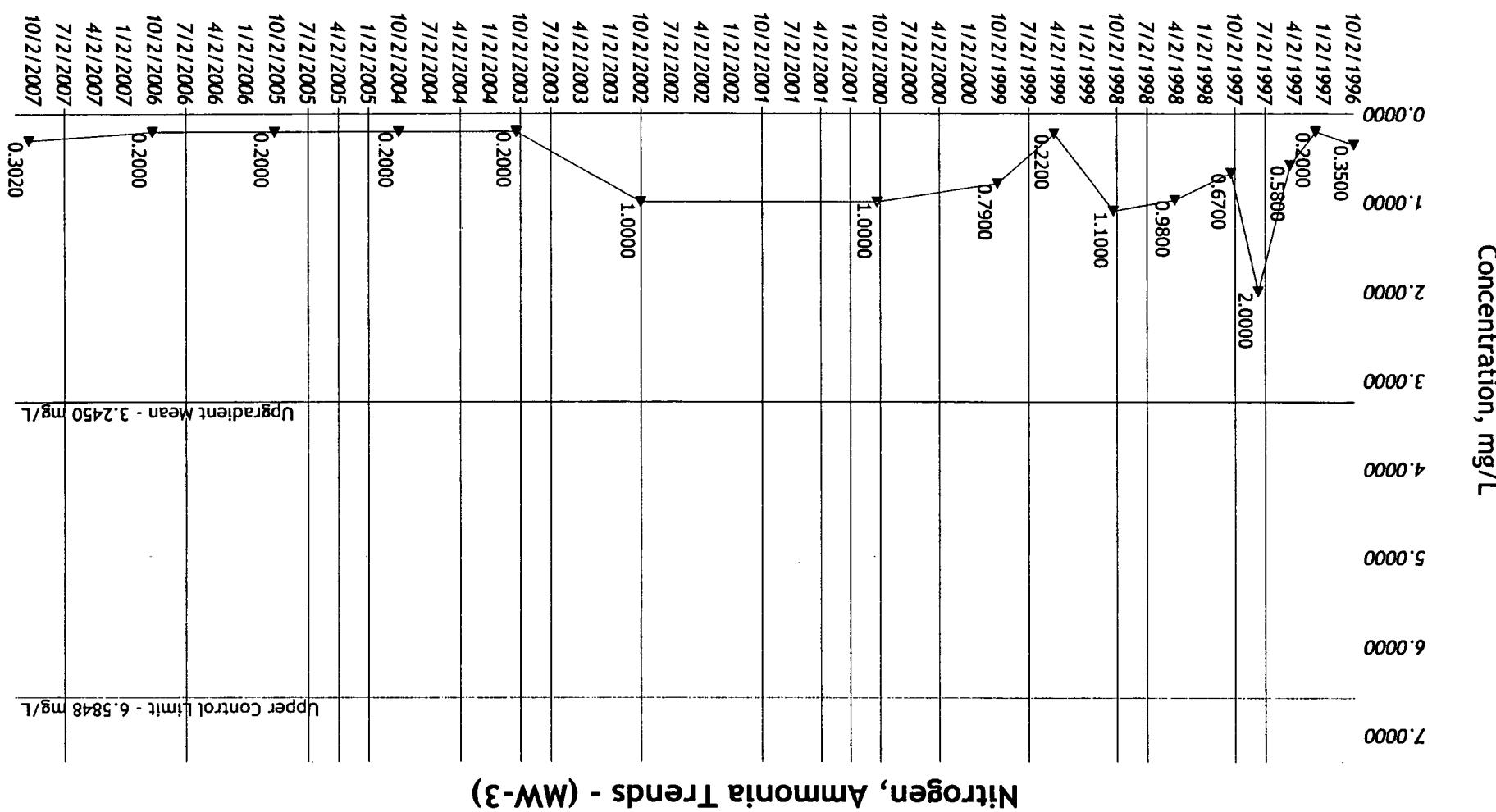
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14

78-SDP-02-80C

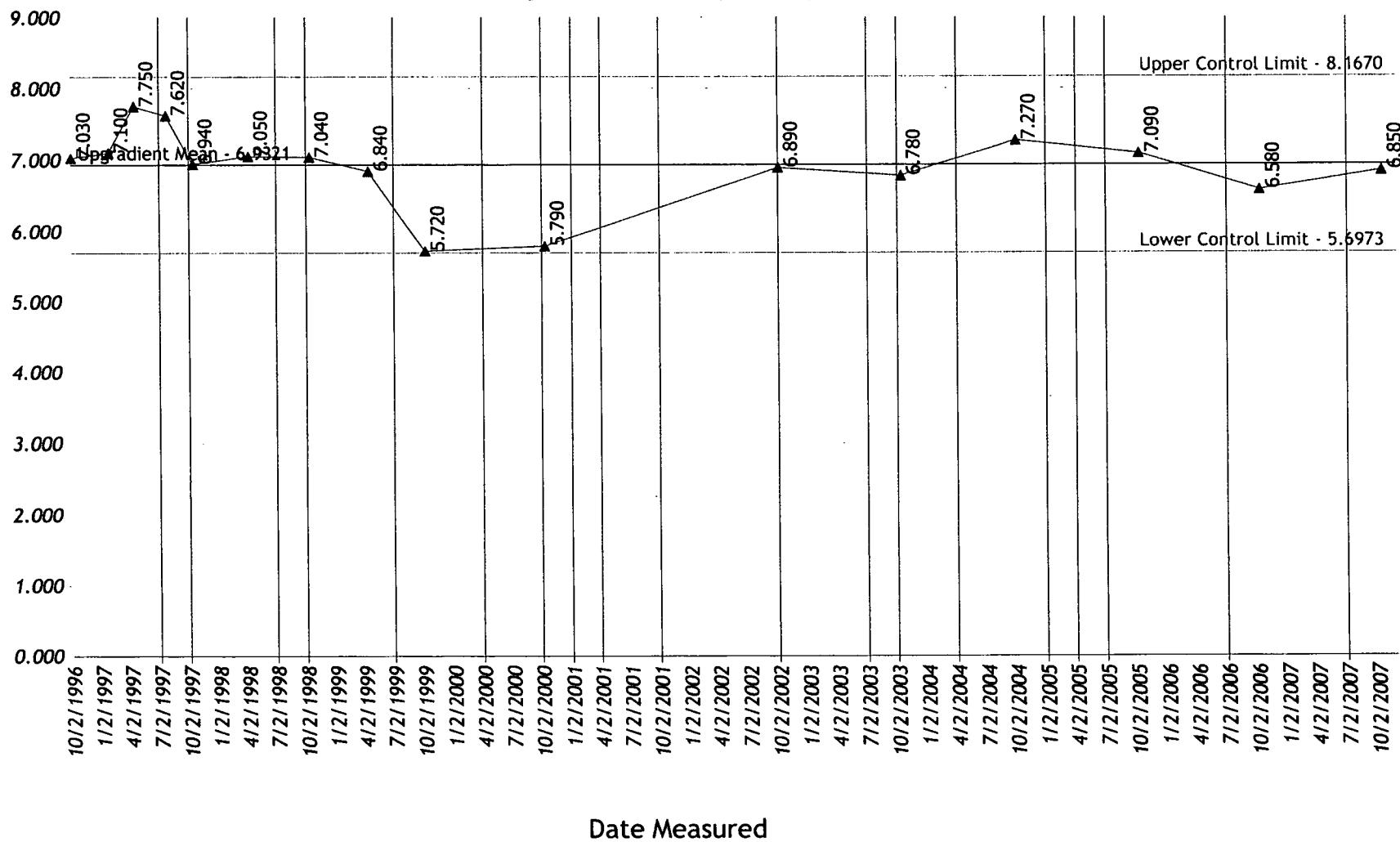
Nitrogen, Ammonia
Carter Lake Construction and Demolition Landfill (Closed)

07101
11/28/2007 11:57:22 AM



Concentration, S.U.

pH Trends - (MW-3)



15

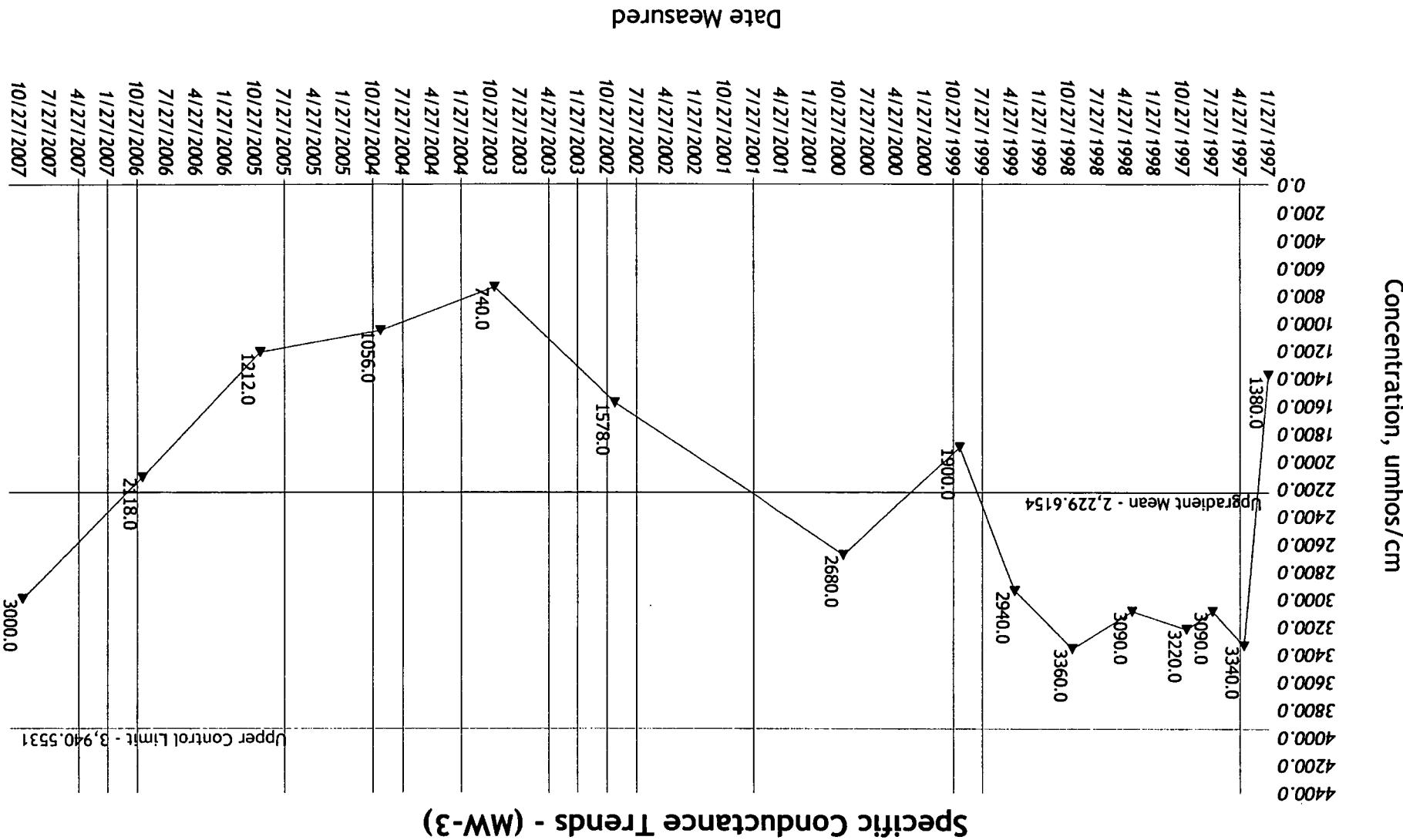
pH

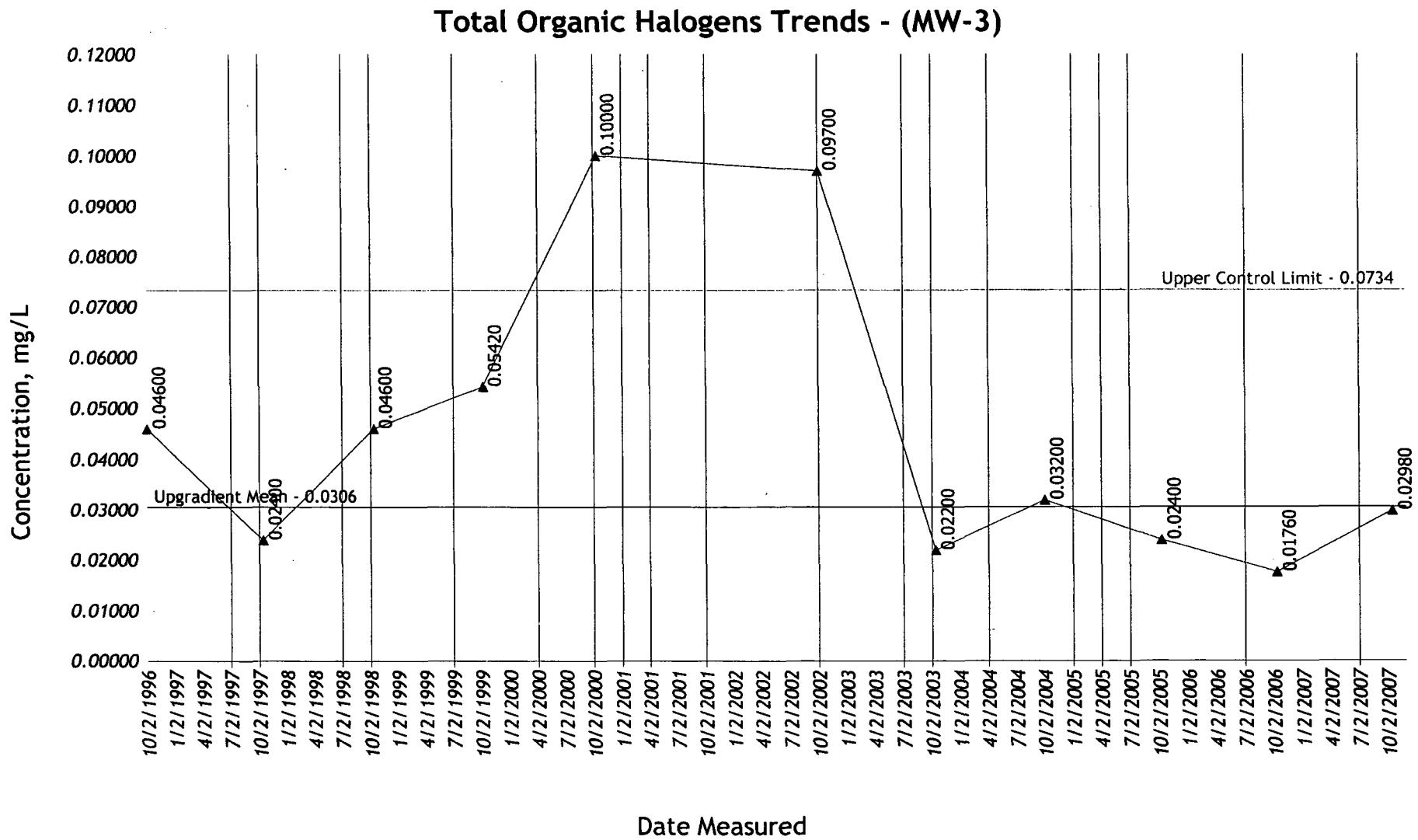
Carter Lake Construction and Demolition Landfill (Closed)

78-SDP-02-80C

07101

11/28/2007 11:57:23 AM

Specific Conductance
Carter Lake Construction and Demolition Landfill (Closed)07101
11/28/2007 11:57:23 AM



17

Total Organic Halogens
Carter Lake Construction and Demolition Landfill (Closed)
 78-SDP-02-80C

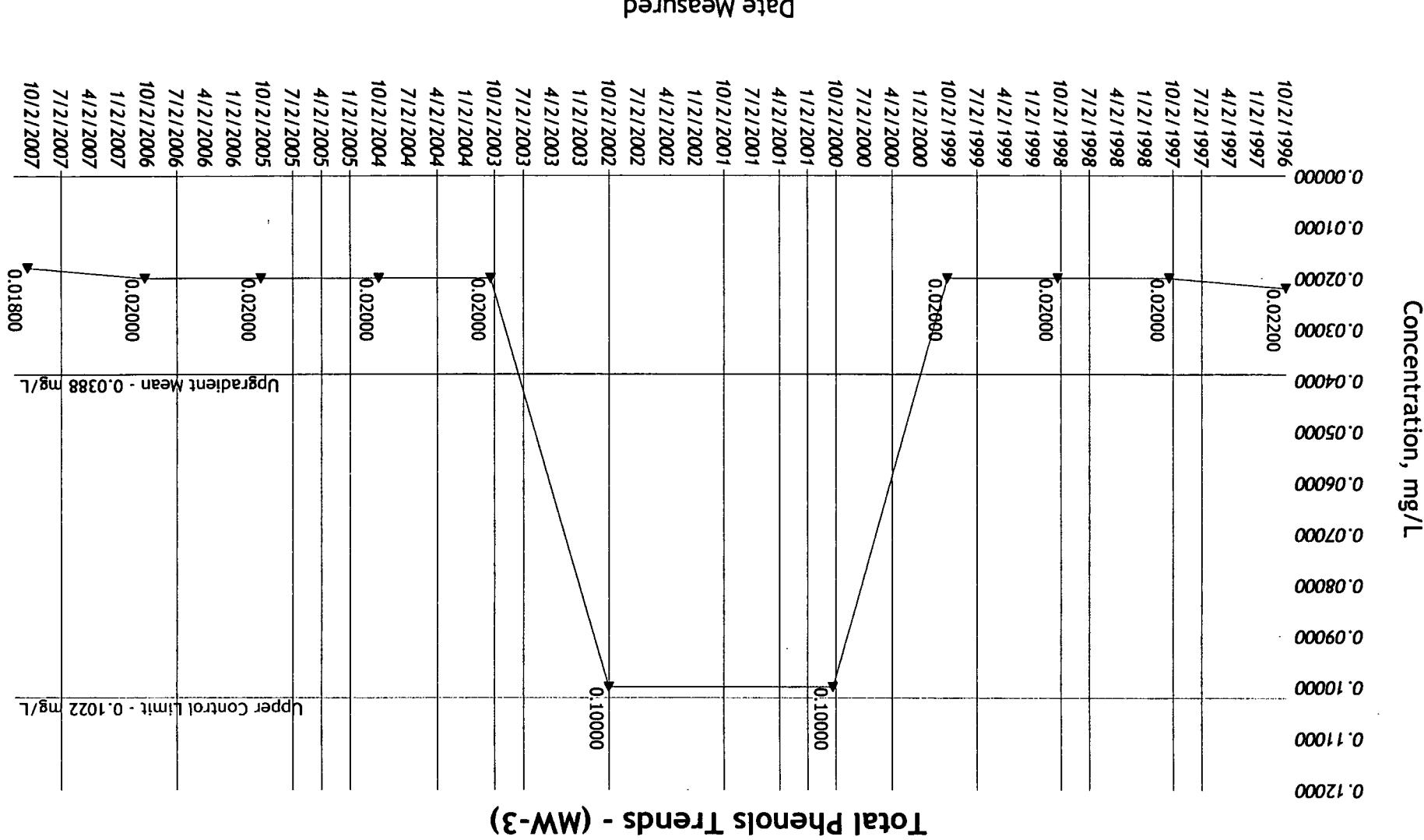
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Carter Lake Construction and Demolition Landfill (Closed)

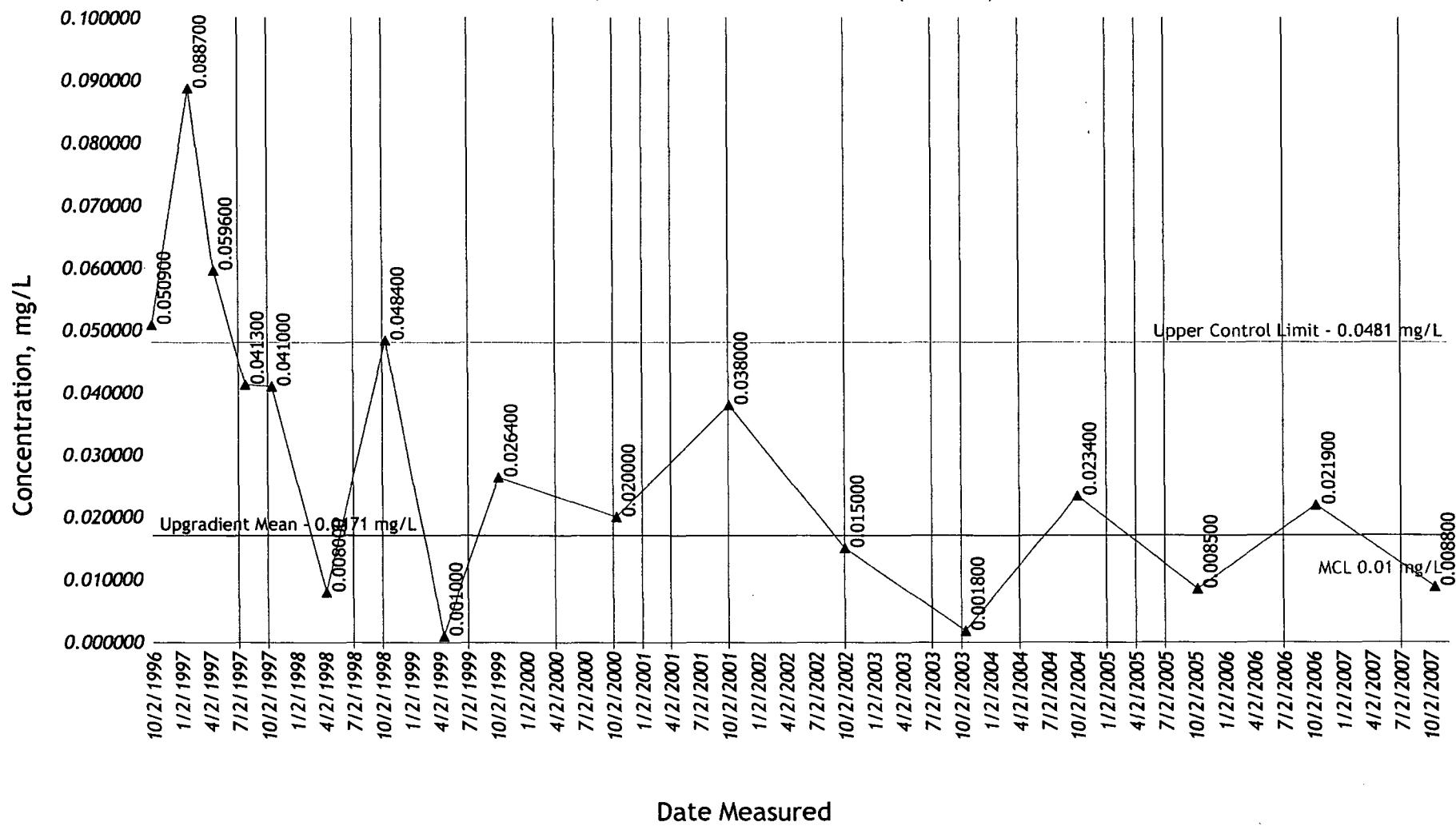
Total Phenols

11/28/2007 11:57:23 AM

07101



Arsenic, Dissolved Trends - (MW-5)



19

Arsenic, Dissolved
Carter Lake Construction and Demolition Landfill (Closed)
 78-SDP-02-80C

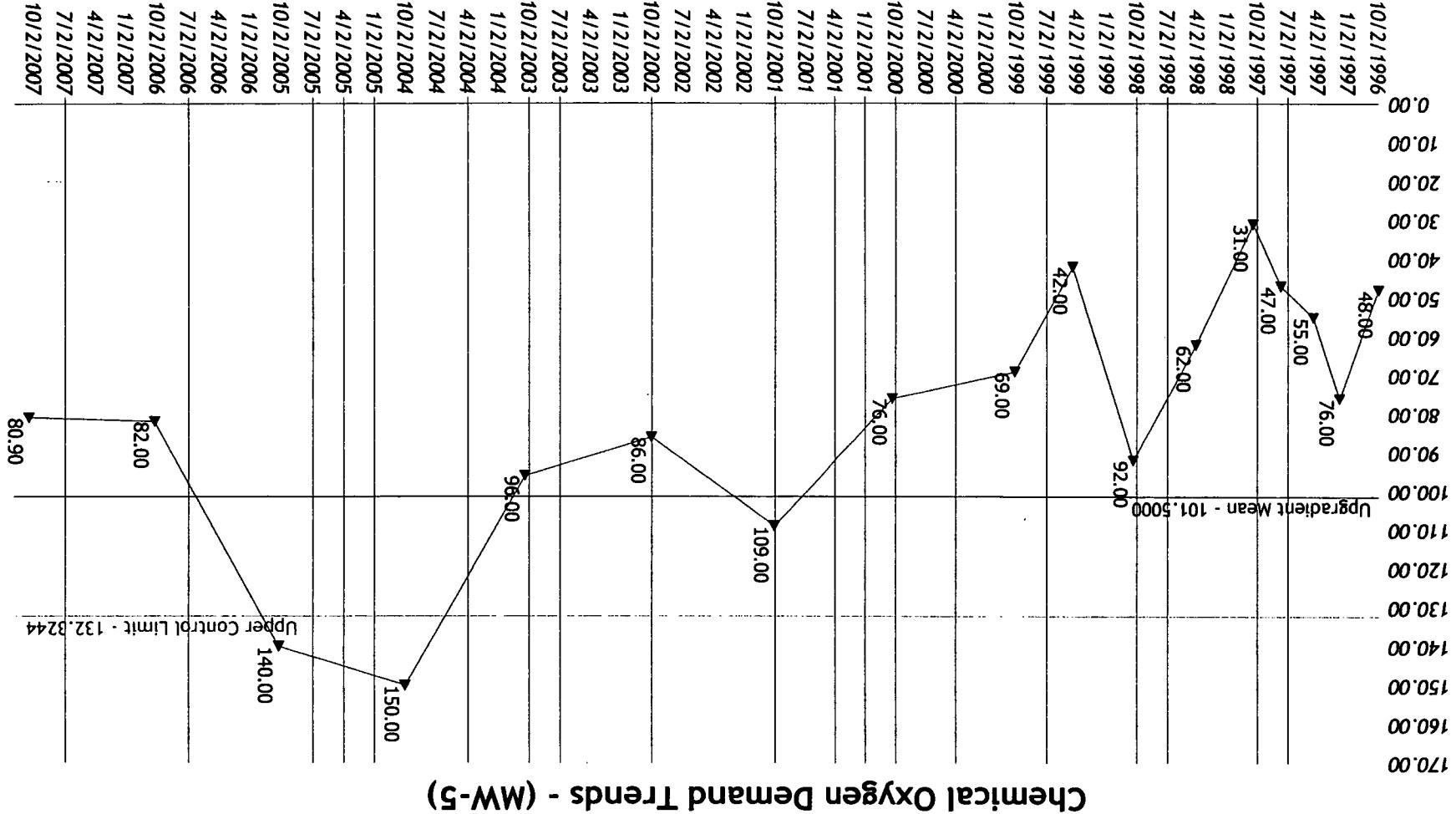
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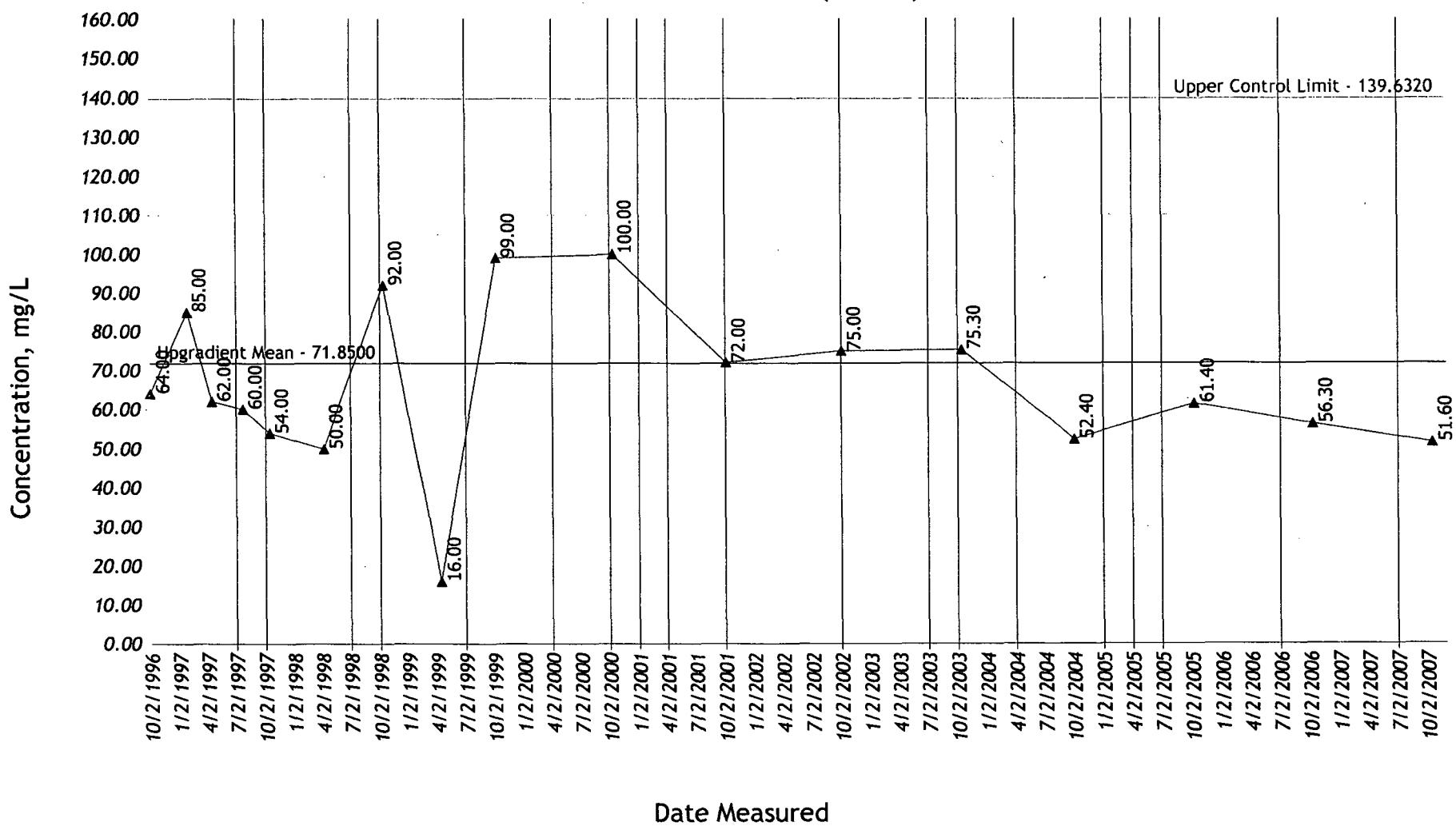
78-SDP-02-80C
Carter Lake Construction and Demolition Landfill (Closed)

11/28/2007 11:57:24 AM
07101

Concentration, mg/L



Chloride Trends - (MW-5)



21

Chloride
Carter Lake Construction and Demolition Landfill (Closed)
78-SDP-02-80C

07101
11/28/2007 11:57:24 AM

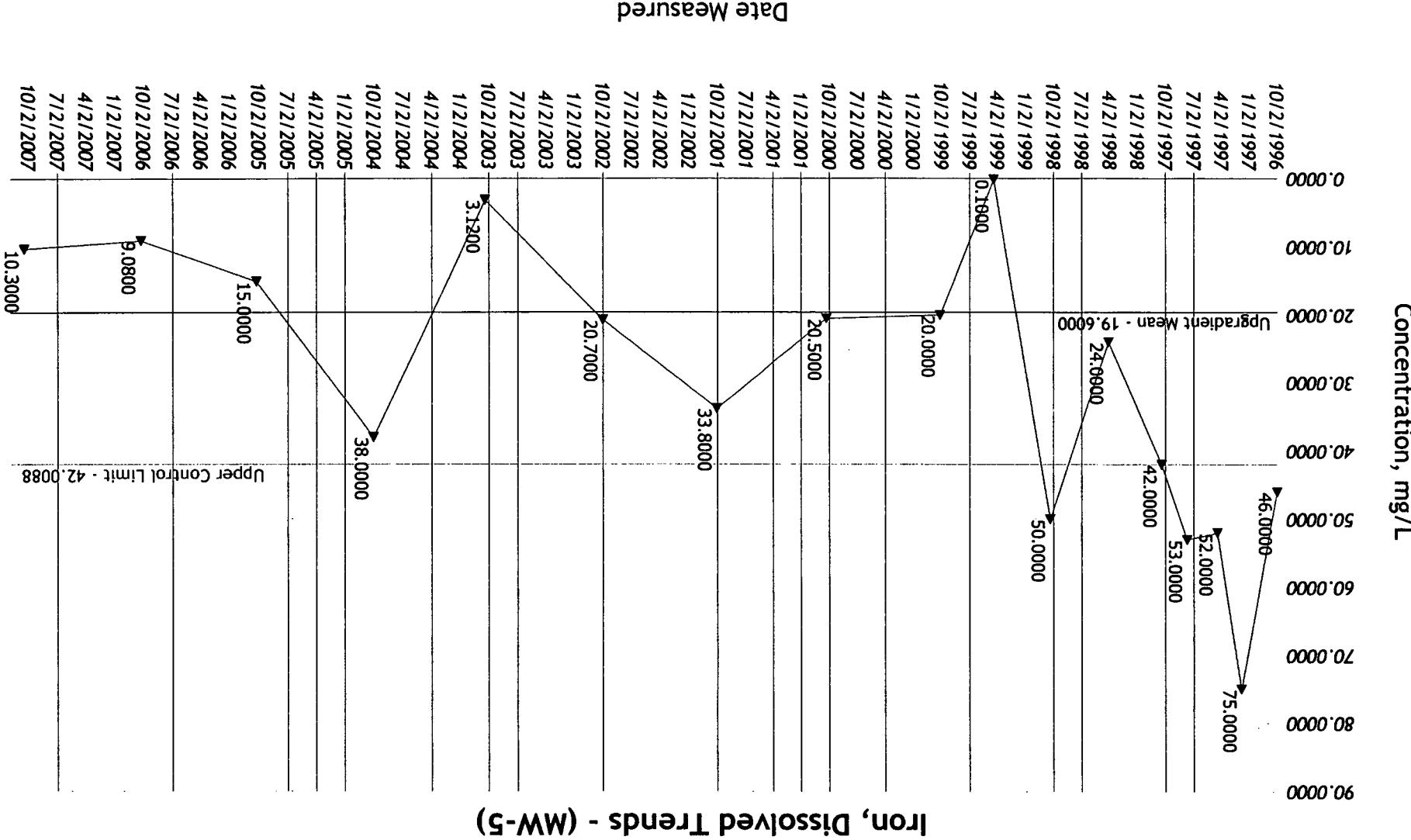
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78-SDP-02-80C
Carter Lake Construction and Demolition Landfill (Closed)

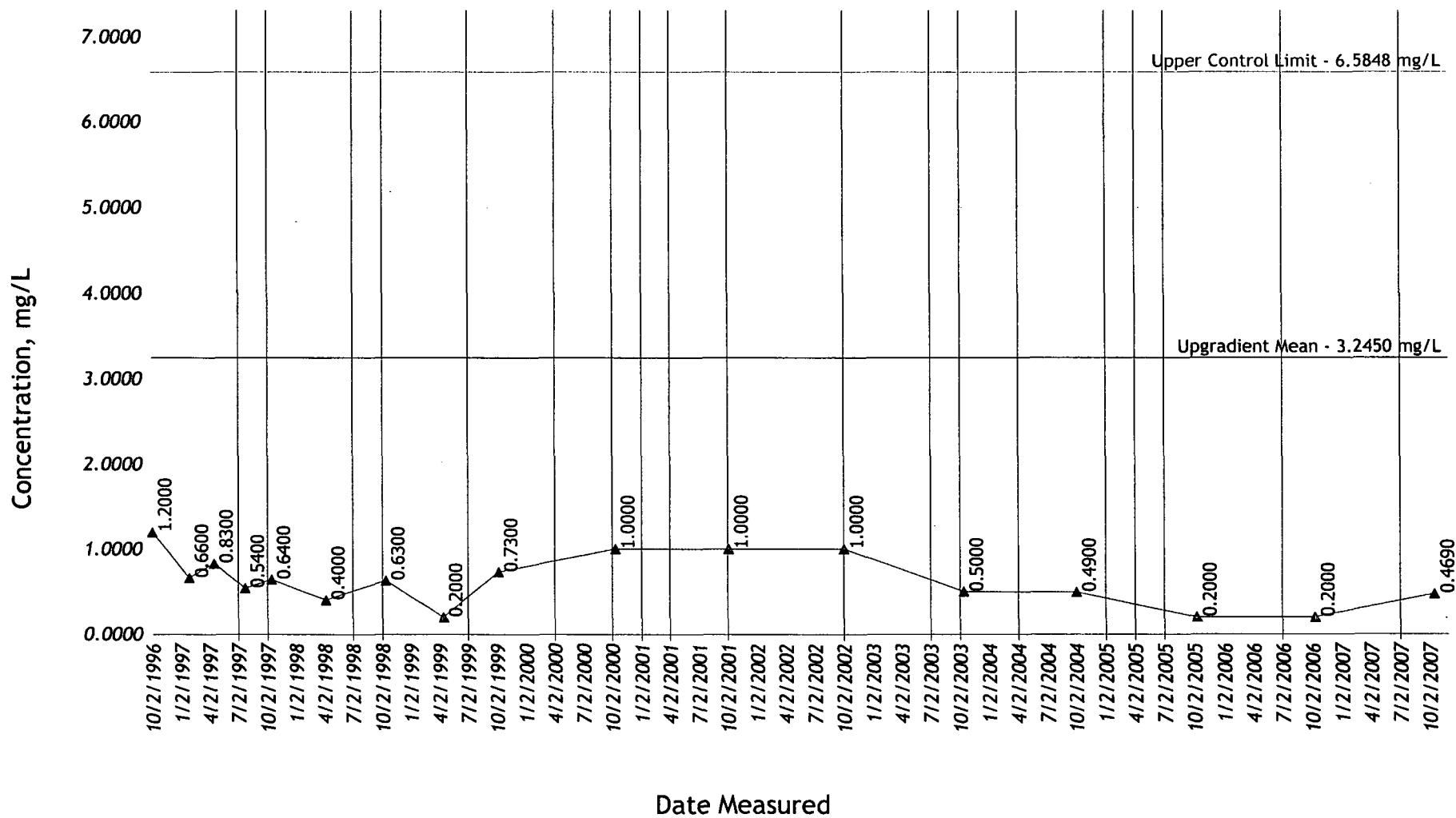
Iron, Dissolved

07101

11/28/2007 11:57:25 AM



Nitrogen, Ammonia Trends - (MW-5)



23

Nitrogen, Ammonia
Carter Lake Construction and Demolition Landfill (Closed)
78-SDP-02-80C

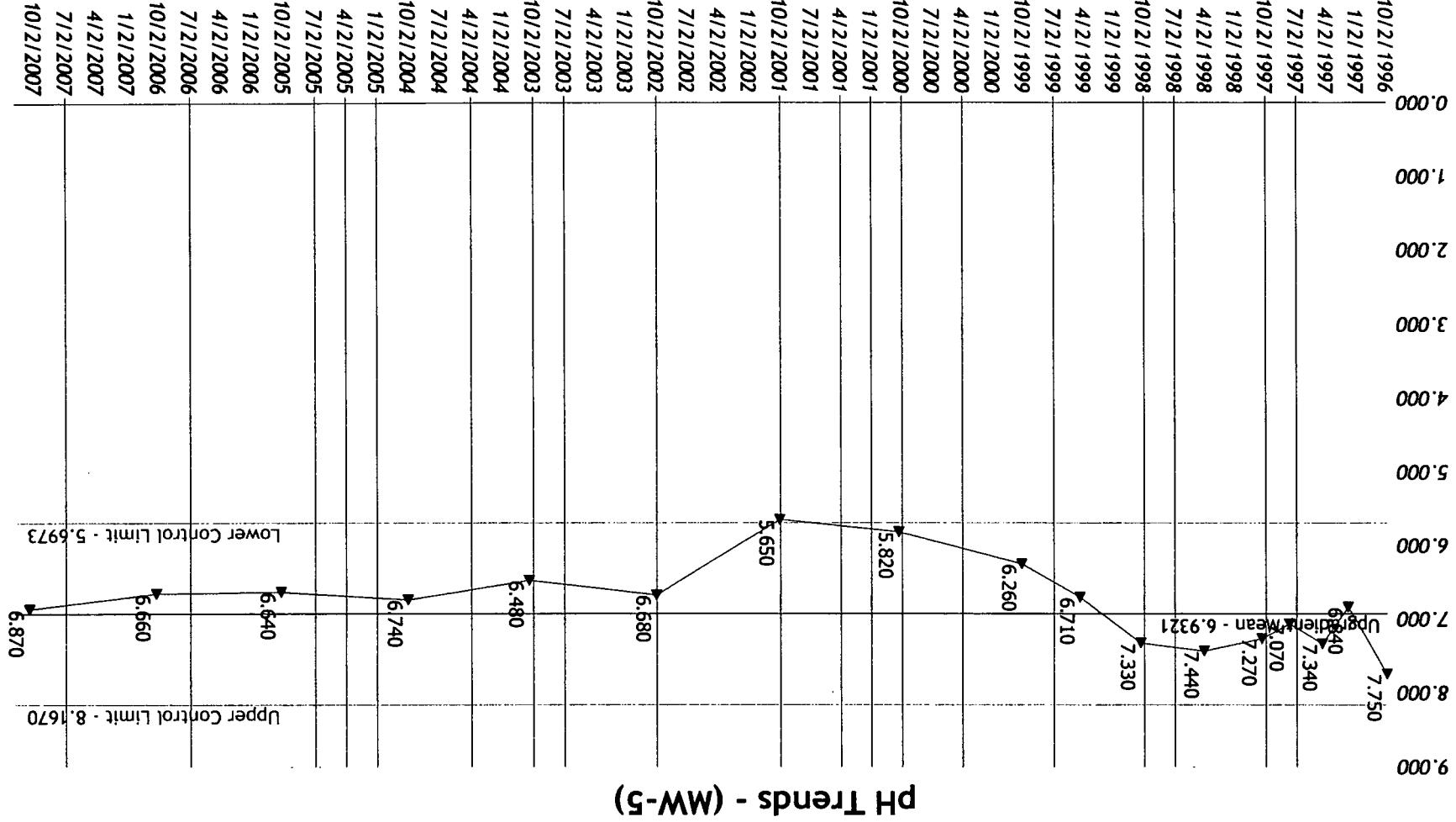
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24

78-SDP-02-80C

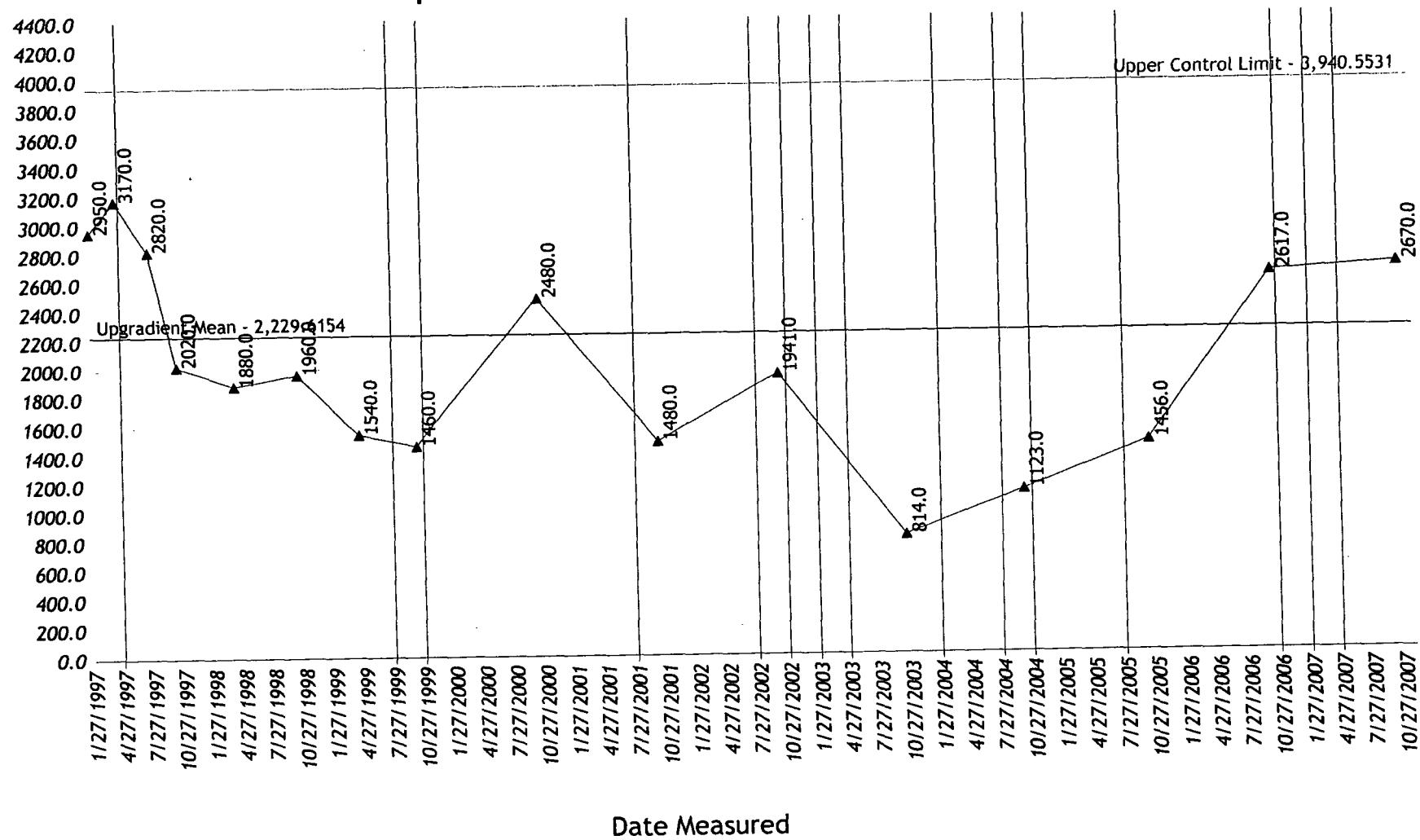
PH

Carter Lake Construction and Demolition Landfill (Closed)

07101
11/28/2007 11:57:25 AM

Concentration, umhos/cm

Specific Conductance Trends - (MW-5)



25

Specific Conductance
Carter Lake Construction and Demolition Landfill (Closed)
78-SDP-02-80C

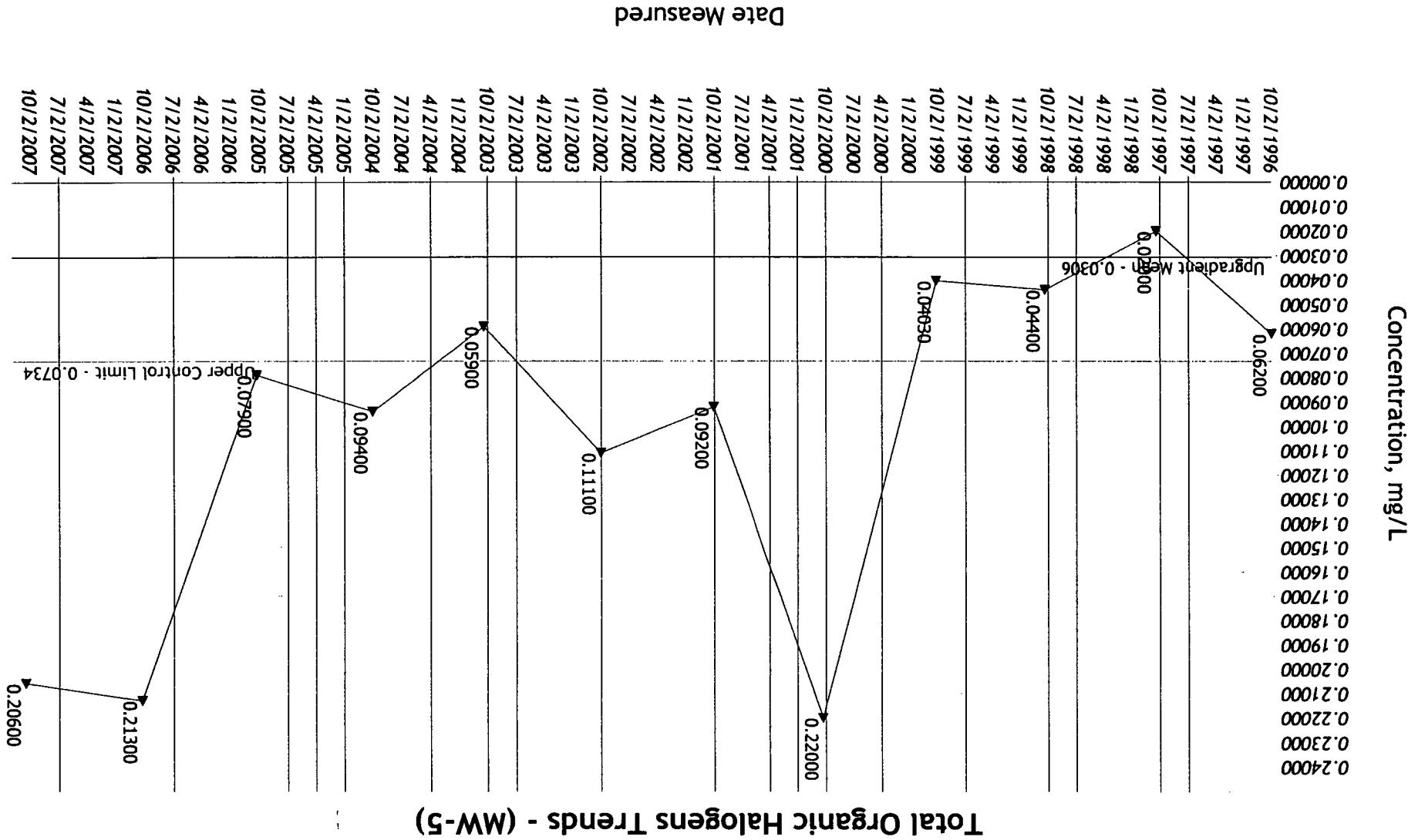
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Total Organic Halogens

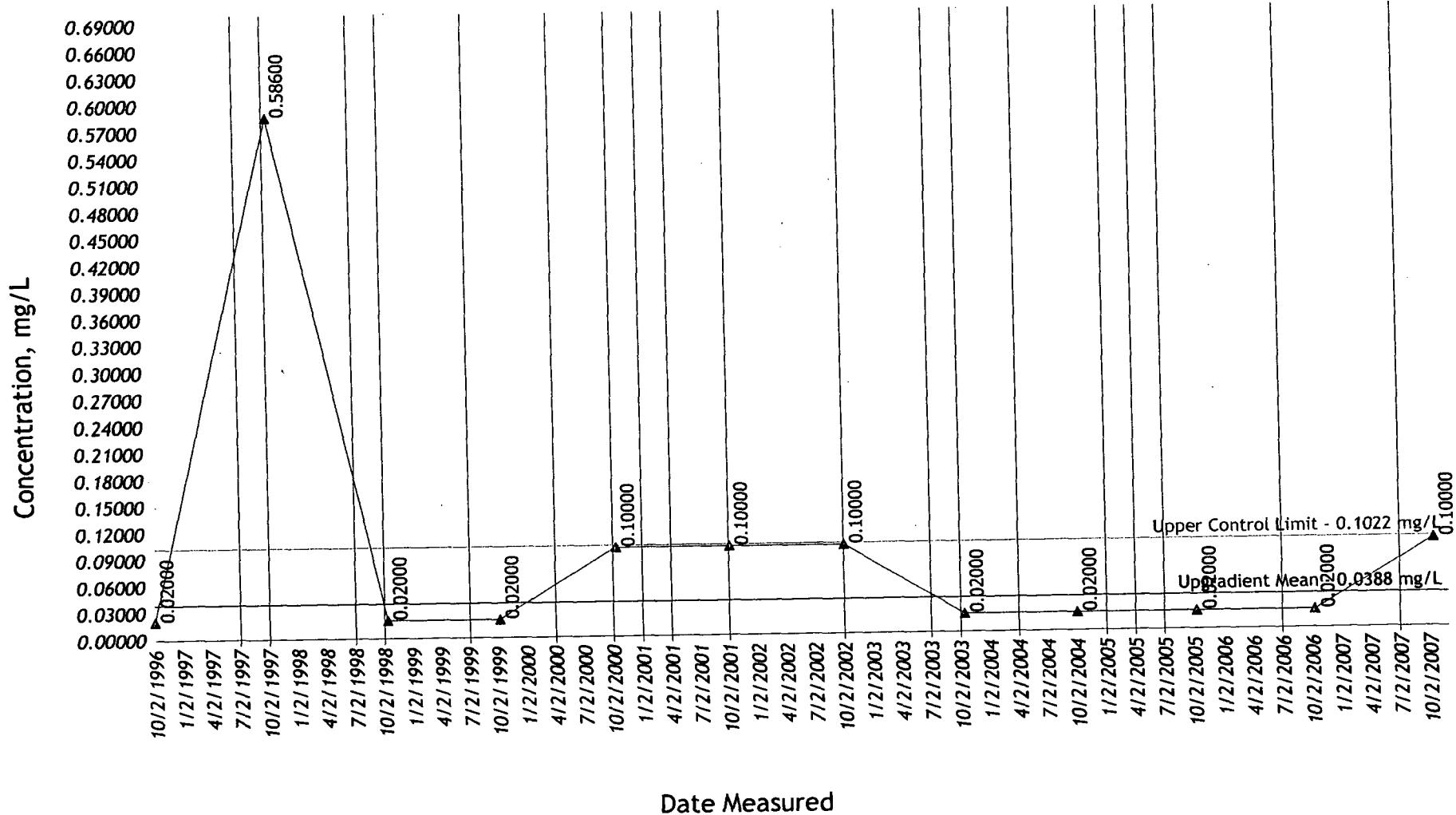
Cartier Lake Construction and Demolition Landfill (Closed)

11/28/2007 11:57:26 AM

07101



Total Phenols Trends - (MW-5)



27

Total Phenols
Carter Lake Construction and Demolition Landfill (Closed)
 78-SDP-02-80C

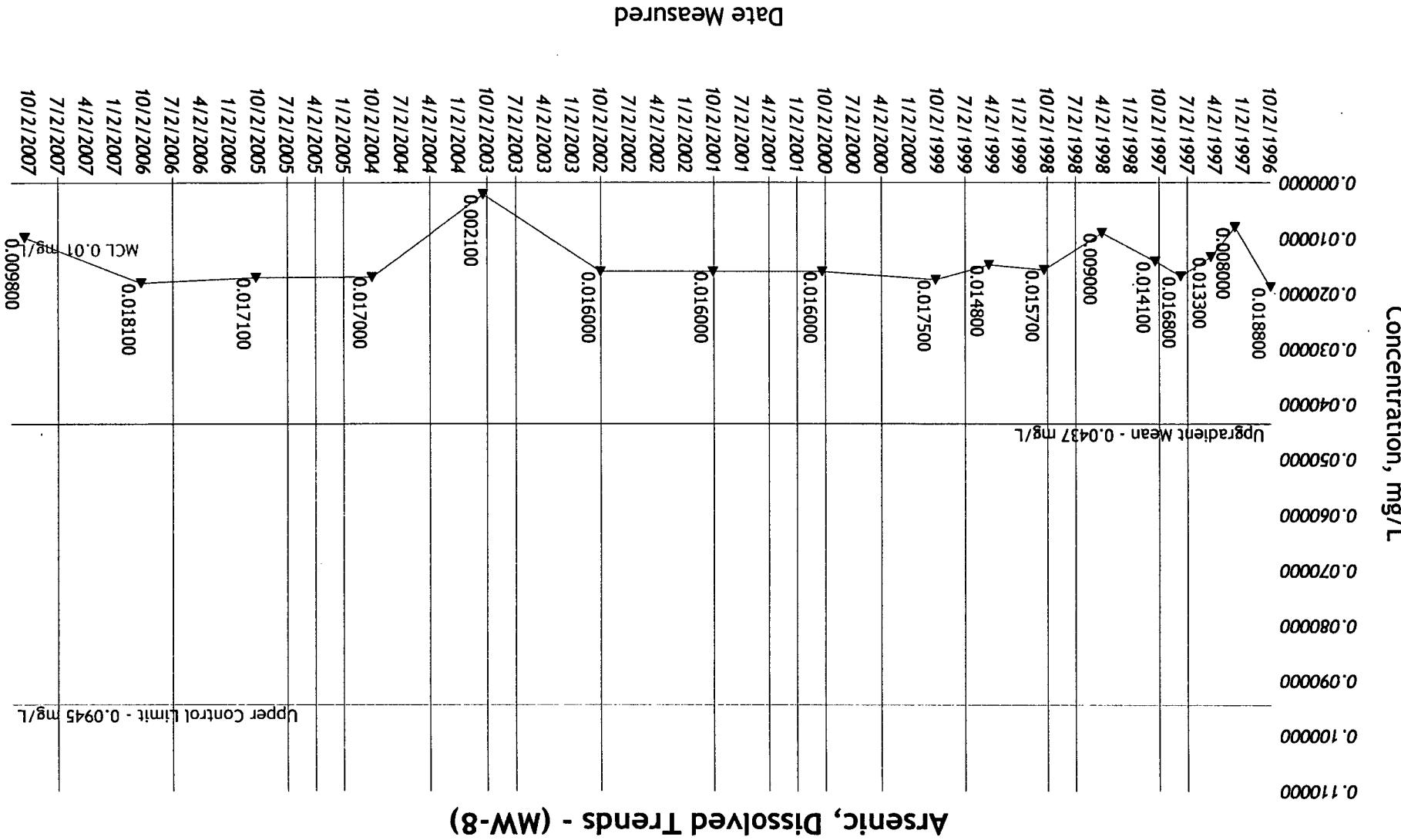
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Carter Lake Construction and Demolition Landfill (Closed)

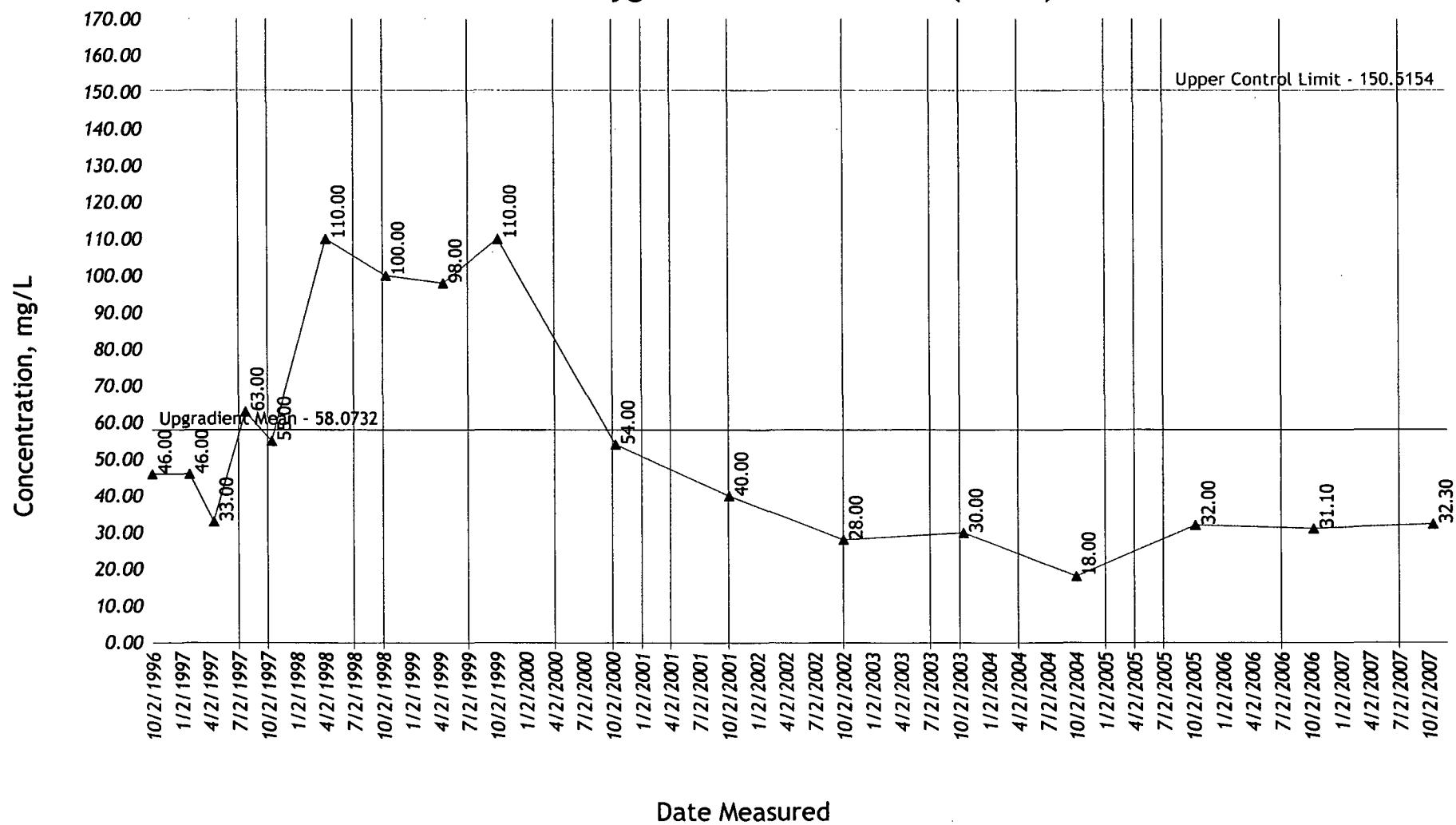
Arsenic, Dissolved

11/28/2007 11:57:26 AM

07101



Chemical Oxygen Demand Trends - (MW-8)



29

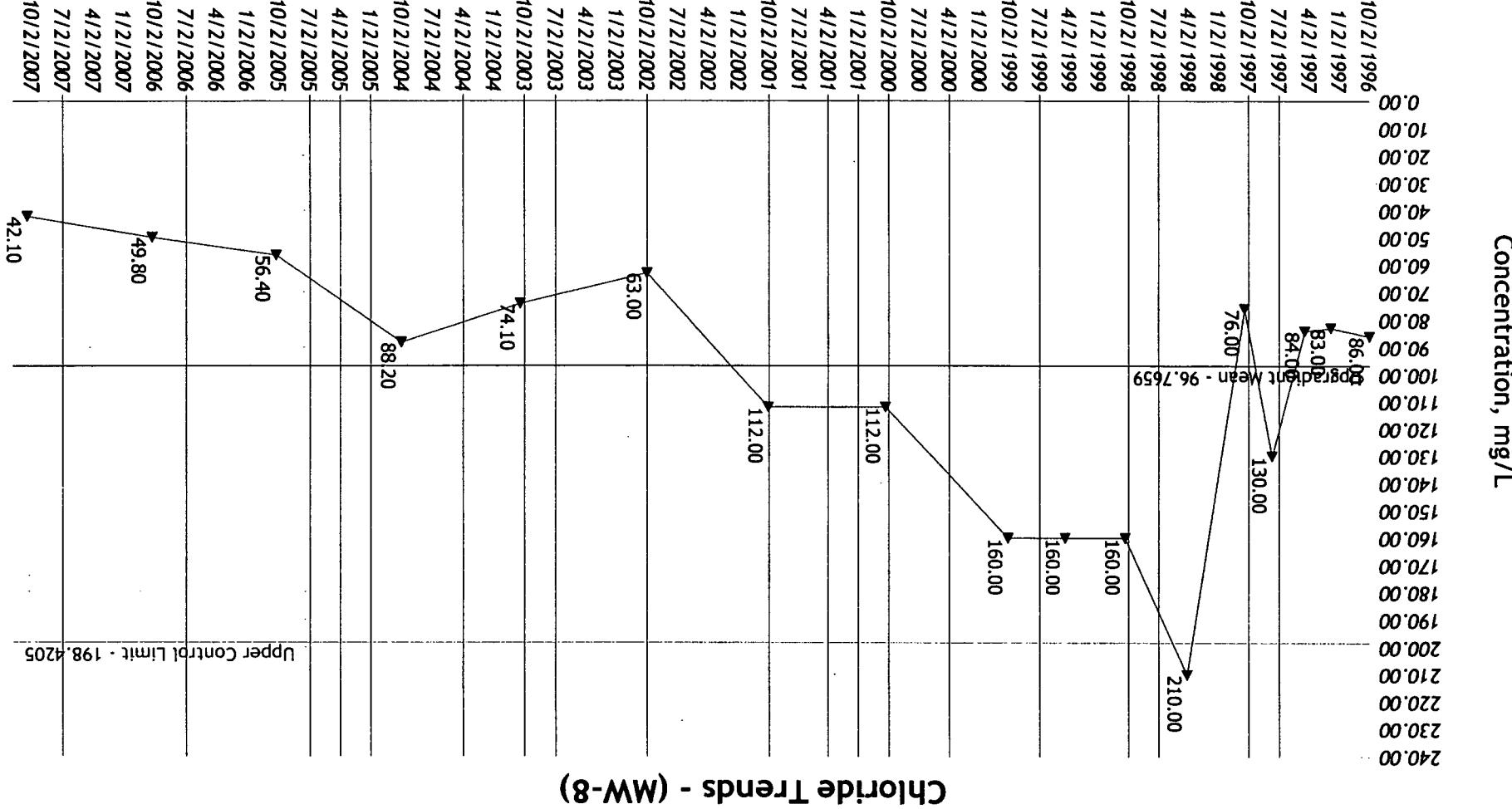
Chemical Oxygen Demand
Carter Lake Construction and Demolition Landfill (Closed)
78-SDP-02-80C

07101
11/28/2007 11:57:26 AM

30

78-SDP-02-80C
 Carter Lake Construction and Demolition Landfill (Closed)
 Chloride

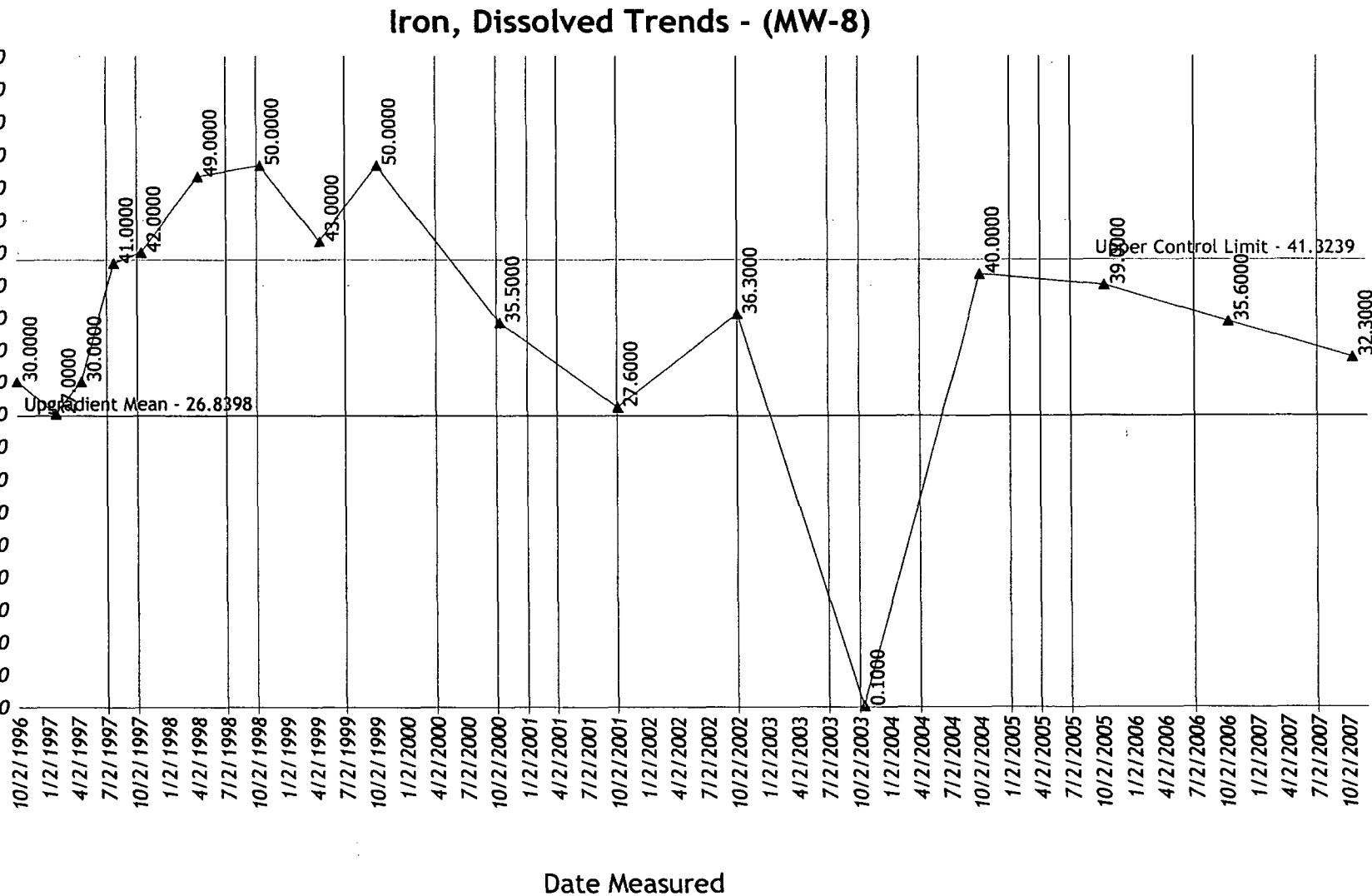
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31

Iron, Dissolved
Carter Lake Construction and Demolition Landfill (Closed)
78-SDP-02-80C

Concentration, mg/L



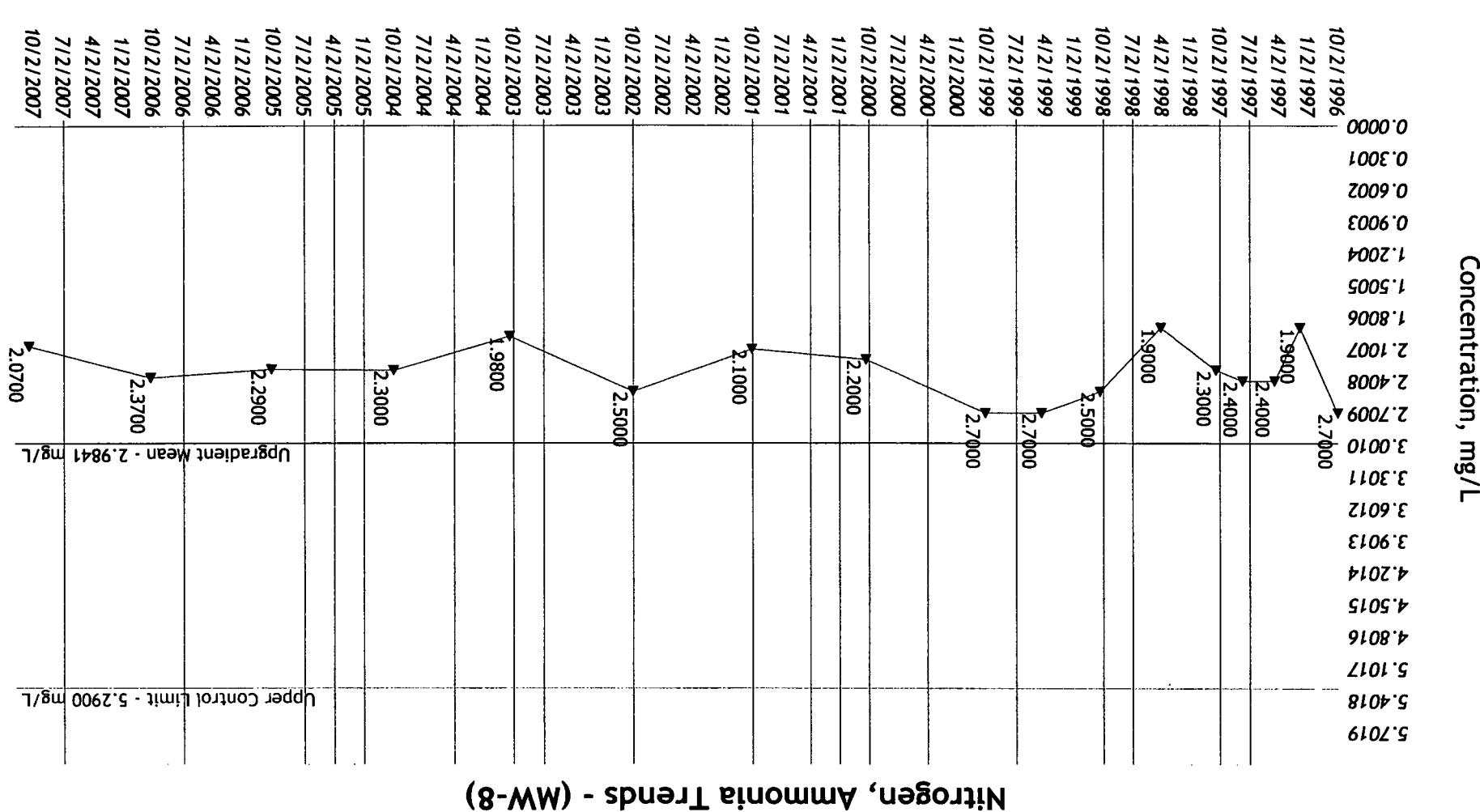
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11/28/2007 11:57:27 AM

32

78-SDP-02-80C

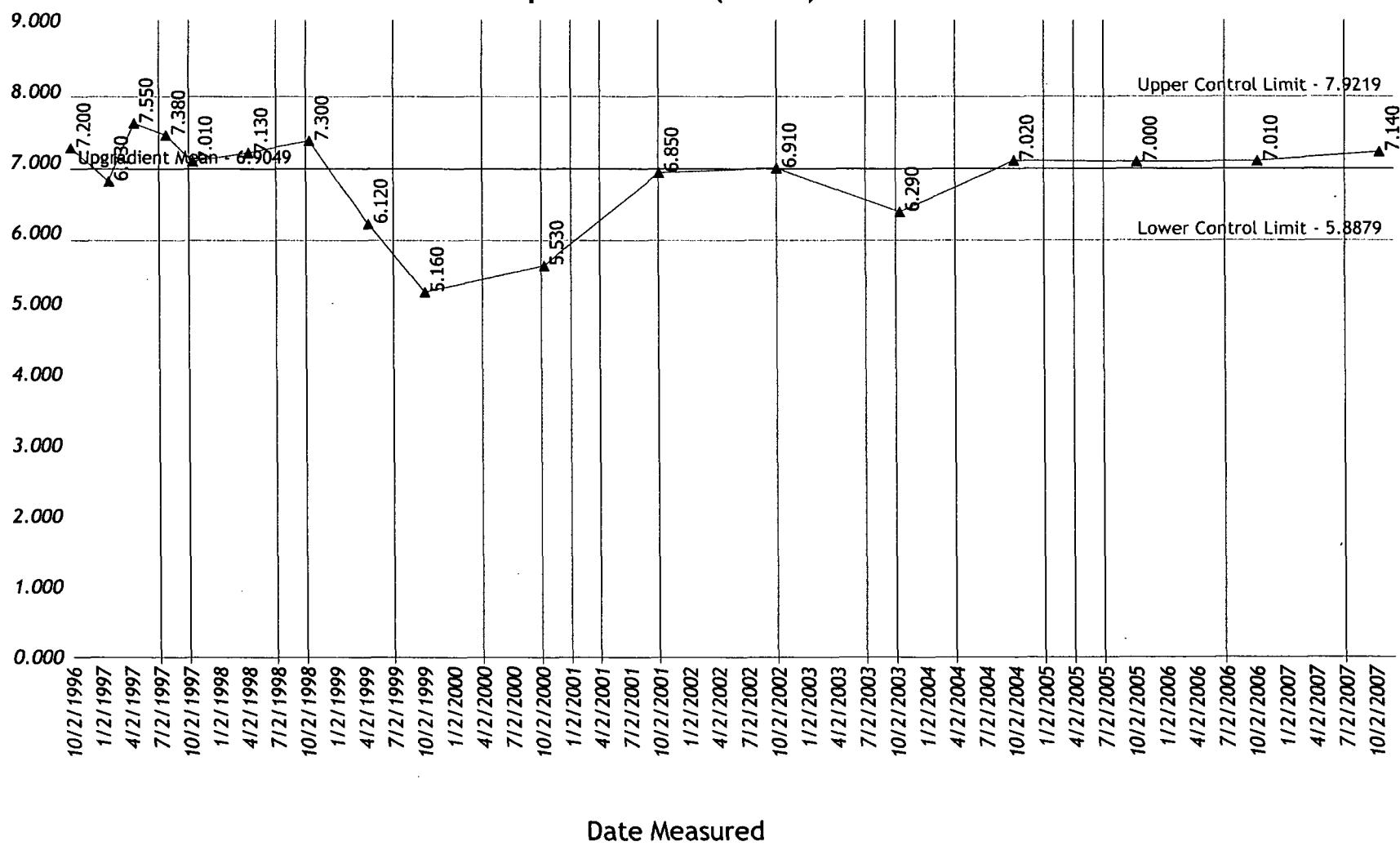
Nitrogen, Ammonia
Carter Lake Construction and Demolition Landfill (Closed)

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Concentration, S.U.

pH Trends - (MW-8)



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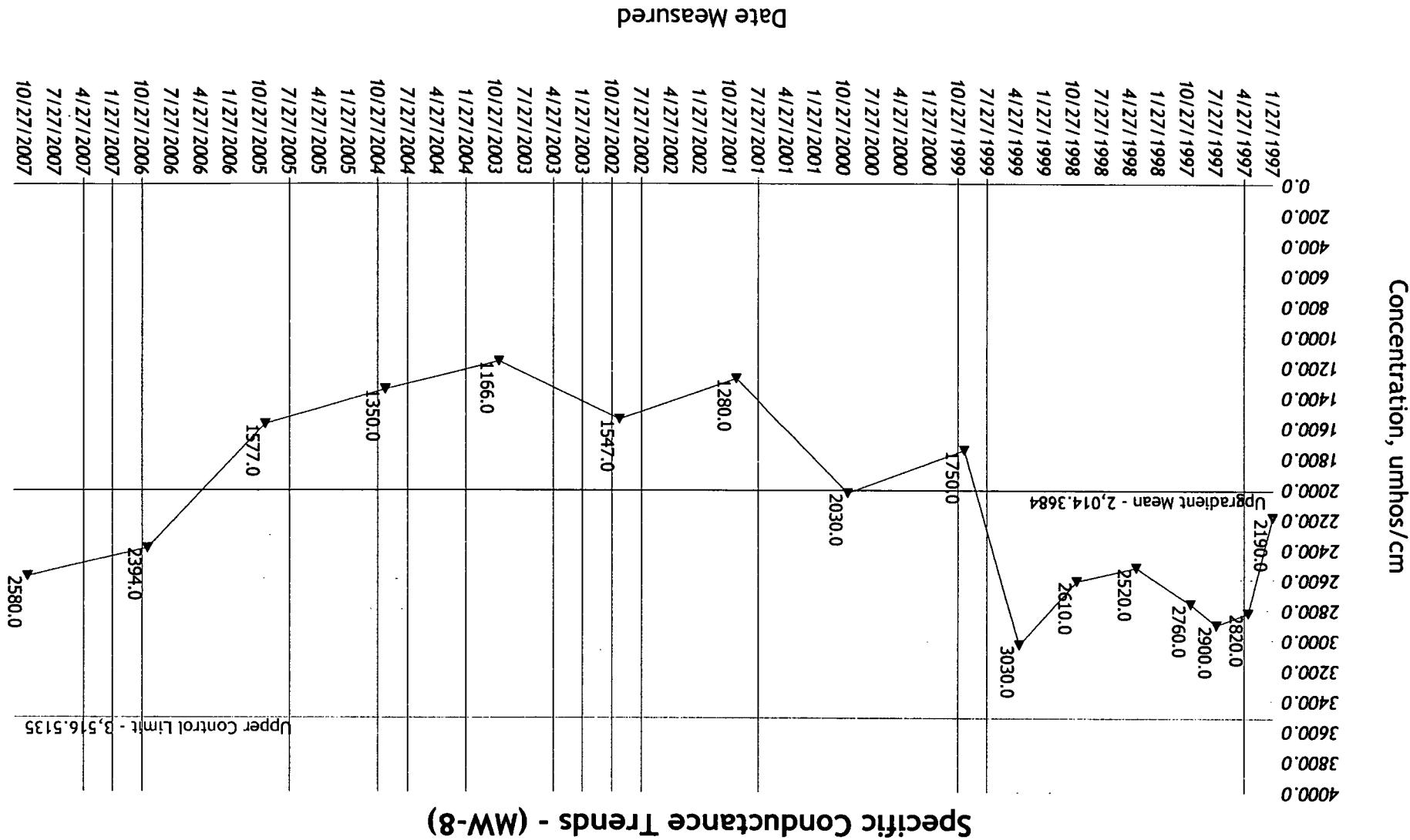
pH

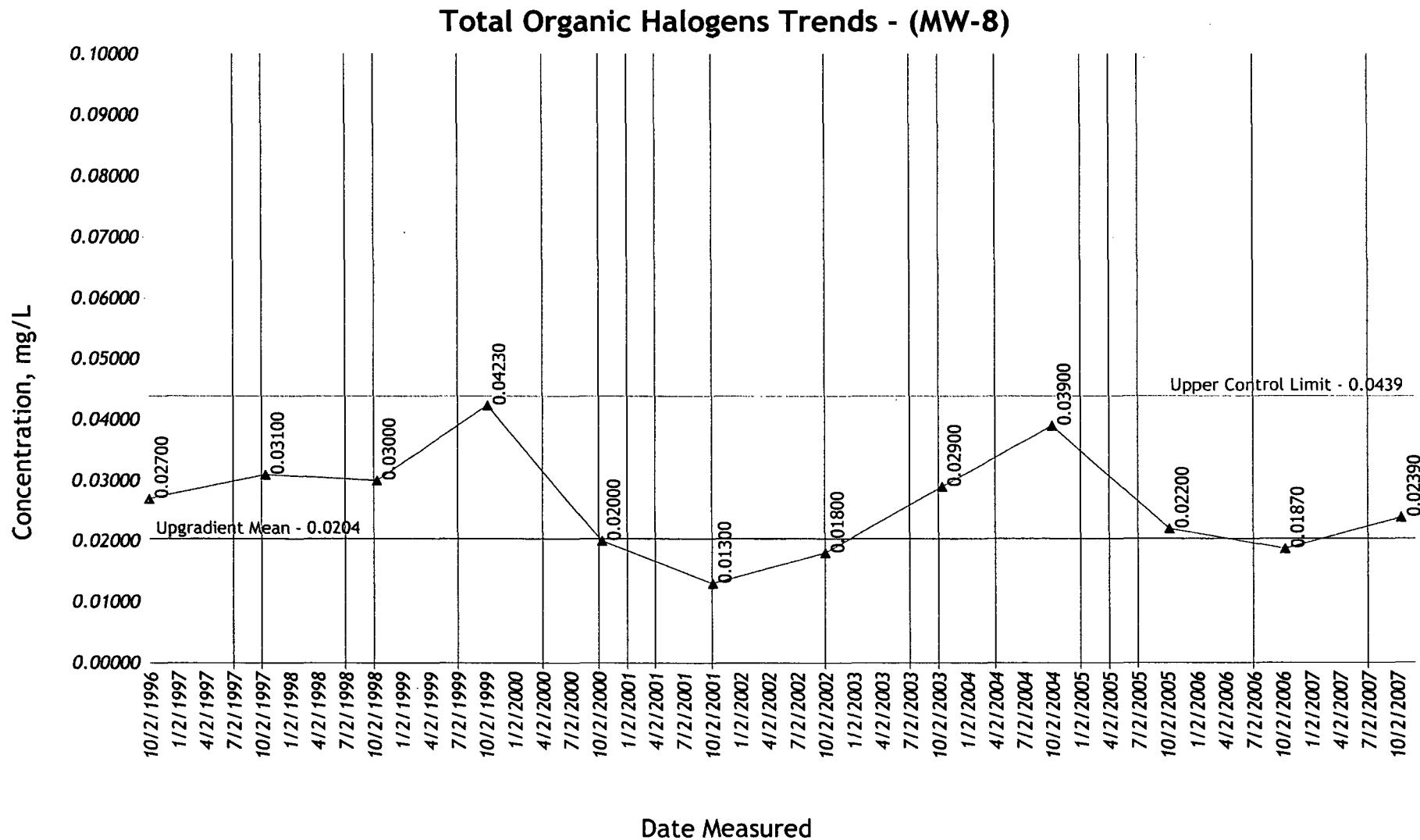
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Total Organic Halogens
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